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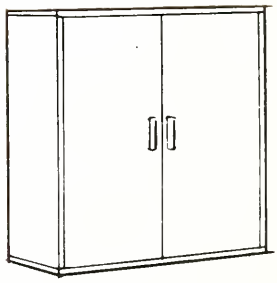
# IMPROVE YOUR HOME WITH BUILT-INS

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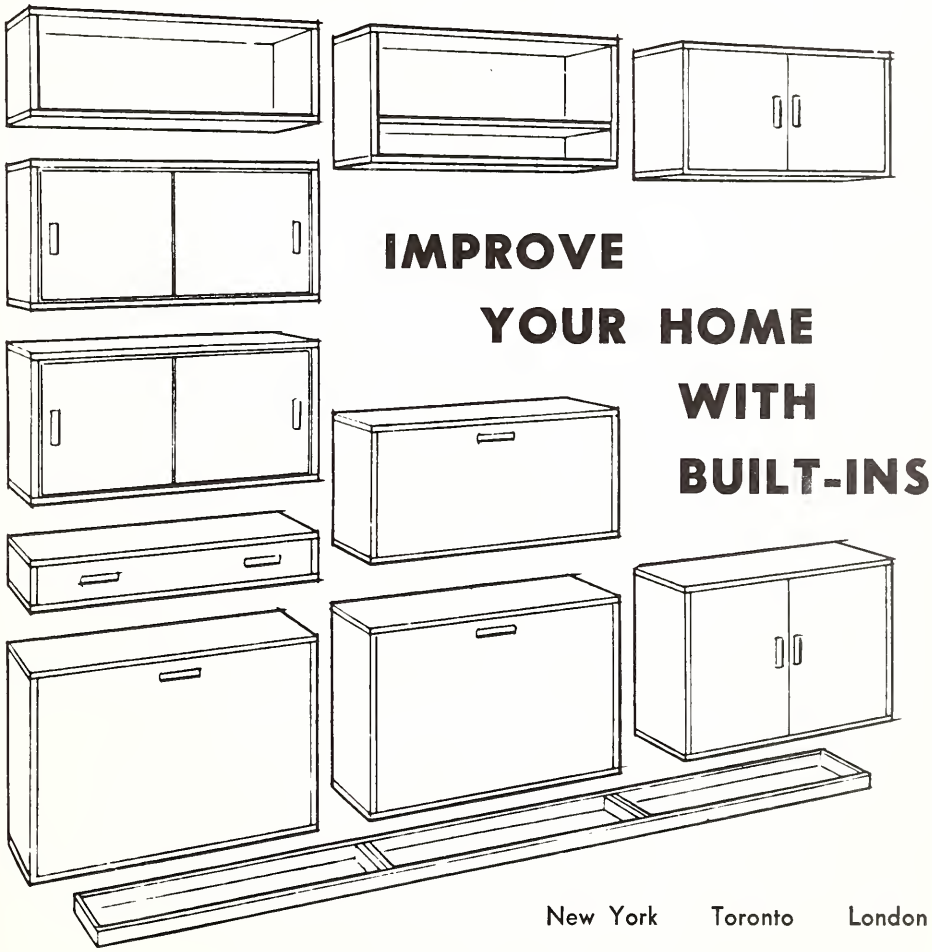
IMPROVE YOUR HOME WITH BUILT-INS

PLYWOOD PROJECTS FOR THE HOME CRAFTSMAN

HANDICRAFT HOBBIES FOR PROFIT



ROBERT SCHARFF



# IMPROVE YOUR HOME WITH BUILT-INS

New York Toronto London

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*IMPROVE YOUR HOME WITH BUILT-INS*

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*To My Wife and Daughters*
*Helen, Alpha Jay, and Nan*

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# PREFACE

THE purpose of this book is to show the average home handyman how he can improve his home with built-ins. Built-ins can be used in every house, and will do wonders toward making any home more beautiful and comfortable.

Everyone wants to improve his home, but in these days of high costs, most of us feel we cannot afford it. This is generally true if you hire skilled labor to do the job for you. But should you eliminate labor cost or a good portion of it, you will find that you can afford many home luxuries that will make yours one of which you and your family can be proud. This book will help you make these luxuries in the easiest and quickest way possible. What is most important, perhaps, is that the book was written specially for the man (or woman) who has no special training in carpentry or woodworking.

As you can see by the table of contents, there are built-in improvements for every room in the house. In addition to this, there are three chapters devoted to detailed descriptions on construction methods, general improvement procedures, and wood-finishing techniques. In other words, the author compiled all the necessary information in this book to help you make the difference between just any old house and a house of distinction.

The author wishes to thank the following for their technical assistance and the use of their photographs and material: Richard Lowell of United States Plywood Corporation; Gordon Parker of Skil Corporation; E. G. Schav of *Practical Builder;* Bradley P. Williams of Masonite Corporation; Charles A. Wayman of *Popular Home;* R. E. Fellows of Heatilator Corporation; Larry Eisinger of Fawcett Books; Vernor M. Schenck II of Joseph R. Gerber Company; Alfred A. Frantz of the Tile Council of America; Clyde O. Hess of Armstrong Cork Company; Frank Brunckhorst and Maurice E. Collins of Lawrence H. Selz Organization, Inc.; Hardwood Plywood Institute; Kentile, Inc.; Pittsburgh Plate Glass Company; Soss Manufacturing Company; Celotex Corporation; American Toy Institute; National Oak Flooring Manufacturers' Association; Douglas Fir Plywood Association; Westinghouse Electric Corporation; General Electric Company; Malarkey Plywood Corporation; Roddis Plywood Corporation; Delta Power Tool Division; The Stanley Works; American Radiator and Standard Sanitary Corporation; United States Gypsum Corporation; Western Pine Association; Kimble Glass Company; Plumbing and Heating Industries Bureau; Monsanto Chemical Company; *Home Craftsman* magazine; *Home Maintenance and Improvement* magazine; *The Business of Farming* magazine; and *Woman's Day* magazine. I would also like to thank the publications *Argosy, American Home, Mechanix Illustrated, American Legion* magazine, and *Popular Mechanics,* to which I contribute, for permission to reuse some of my material.

*Robert Scharff*

# CONTENTS

PREFACE vii

1 HOW TO IMPROVE YOUR HOME 1

2 BASIC CONSTRUCTION FACTS 3

3 REMODELING PROBLEMS AND THEIR SOLUTION 21

4 LIVING-AREA IMPROVEMENTS 42

5 KITCHEN–LAUNDRY AREA IMPROVEMENTS 70

6 BEDROOM IMPROVEMENTS 97

7 YOUR CHILDREN'S ROOM 115

8 BATHROOM IMPROVEMENTS 133

9 MAKE THE MOST OF YOUR ATTIC 154

10 MAKE THE MOST OF YOUR BASEMENT 181

11 CLOSET AND STORAGE PROBLEMS 200

12 WOOD FINISHING 227

INDEX 239

# CHAPTER 1

## HOW TO IMPROVE YOUR HOME

ACHIEVING a home of distinctive beauty sounds more difficult than it really is. Actually, the success of all your efforts will depend on planning. In most homes, lack of planning results in a jungle of furniture, and improper arrangement makes homemaking a difficult task. Practical planning of the average home, of course, must be limited to easily and immediately obtained results, but future expansion and changes should also be taken into consideration. In a well-designed room, flexible furniture units and built-ins should be so placed as to serve their function with a maximum of efficiency and comfort. With well-integrated built-ins, less movable furniture is required.

Later chapters will explain how to plan each room of your house and how to make simple built-in additions that you can build yourself. Built-ins can bring an old house up to date, help modernize kitchens and bathrooms, and put closets as well as attic and basement to better use. The plans given in these chapters are not mere decorator's stunts. They are suggestions for permanent improvements which you can make yourself. Many of them you will be able to apply without change to the specific problems you face. Others you will want to modify and adapt to meet the particular requirements of space and arrangement in your own home. Chapter 2 explains basic construction, while in Chapter 3 you will find suggestions for the handling and treatment of every interior element of a house—walls, ceiling, floors, windows, doors, attic, and basement. Chapter 12 details different methods of finishing materials.

**Built-ins.** What do we mean by built-ins? Are they actually built into the house, and if so, can they be added to a house already built? By built-in units we simply mean furniture units that are apparently attached to the structural parts of the house. Whether they are actually fastened or only appear to be so, such furniture units can be considered built-ins.

The most important function of built-in furniture is spacesaving. This has become increasingly important as homes have become smaller, with rooms reduced both in number and size. In many cases building-in provides additional storage, drawer space, and closets, simply by using waste space to the best advantage. With proper planning, it offers greater convenience and grace to a room by eliminating several pieces and replacing them with one well-planned unit. In addition, it gives any room a personal, custom-built look, which ready-made movable pieces cannot achieve.

The conveniences that the built-in unit gives to the homemaker are invaluable. It does not have to be moved around for cleaning because it is built or fitted flush to the floor and wall and therefore allows no space for dust and dirt to accumulate.

Apart from making the most of small rooms, built-in units are useful in dividing large ones. Sometimes a more livable scheme can be worked out by building units to act as room dividers, and this is cheaper and more satisfactory than building a partition or wall. Many examples of room dividers are shown in this book. Also in older houses wonderful things can be done by camouflaging undesirable architectural elements with built-ins. By careful planning of built-in furniture you may get extra seating, desk, and work space, and at the same time improve your home.

*Tools.* As a homeowner, you undoubtedly have a certain number of tools around the house which you have picked up for miscellaneous repair jobs. These tools may be adequate for work described in this book. However, to do good work, the following basic tools are recommended:

Crosscut saw (10 points to 1″)
Ripsaw (8 points to 1″)
6″ Screw driver
12″ Screw driver
6″ Combination pliers
10″ Locking pliers
¼″, ½″, ¾″, 1″ Wood chisels
¼″ Hand drill with drill points
10″ Hand brace and assorted bits
6″ Block plane
8″ Smooth plane
14″ Jack plane
Wooden mallet
Set of wood files
Set of adjustable wrenches
Compass saw
Small adjustable clamp vise
Nail set
Pocket knife
Two-faced whetstone
Coping saw
10″ Cabinet rasp
12″ Backsaw (14 points)
12″ Hack saw
28″ Carpenter's level
12″ Combination square
½″ and ¾″ Cold chisels
6′ Folding rule
6″ Marking gauge
10″ Tinner's snips

Although not required, a ¼-inch electric hand drill and 6- or 8-inch portable power saw would speed up your working time and pay for themselves in time saved. For basic construction and use of all tools, see Chapter 2.

# CHAPTER 2

## BASIC CONSTRUCTION FACTS

SINCE most of the projects illustrated in this book are made of wood or wood by-products, a knowledge of the basic elements of construction, carpentry, and cabinetmaking will be necessary to obtain the best results. This includes, among other things, a knowledge of fastenings, joints, hardware installation, etc. These techniques are used in almost every project, and to eliminate repetition, they are all included in this chapter.

Woodworking is divided into 2 main classifications: carpentry and cabinetmaking. Carpentry, in turn, may be classified as rough carpentry and finish carpentry. Rough carpentry includes all work affecting the structural and exterior members of a house. Finish carpentry involves the interior, visible parts of a house where appearance is important. It requires good craftsmanship.

Cabinetmaking is an extension and refinement of finish carpentry. It is used for fashioning cabinets, furniture, and decorative interior woodwork. It requires skill, precision, and a knowledge of joints, wood uses, wood finishes, and the installation of hardware.

**Basic procedures.** In all of your cabinetmaking and carpentry you will follow these 6 major procedures:

1. Lay out the project by measuring, diagraming, and estimating the quantity of materials needed.
2. Mark the materials for length, width, and shape.
3. Cut the material by sawing, planing, or chiseling to the exact sizes required.
4. Join the cut parts into the desired assembly by nailing, screwing, or gluing, and by using the most appropriate of the wide variety of joints available.
5. Prepare the surface for finishing.
6. Apply the finish material selected to give the project its final appearance.

To get the best results from the designs given in this book, there are certain fundamental principles that must be followed:

1. Be accurate when taking measurements and laying out work.
2. Lay out the job clearly by marking the different pieces—front, back, side, etc. Also mark all companion pieces where joints appear as 1 and 1, 2 and 2, etc.
3. Plan ahead as each step is completed.
4. Be orderly and neat. Take pride in turning out a fine job.
5. Use only the best materials. Since the difference in cost between good and cheap materials is small on a single project, it pays to buy the best.
6. Joints must be made to fit together; never make them too loose or too tight. Remember, your finished item is only as strong as its weakest joint.
7. Wherever possible, duplicate pieces should be laid out and cut at the same time. A wood vise may come in handy for such an operation.
8. Keep all tools in good condition. A sharp tool or cutter makes work easier, safer, and more accurate.

# SELECTING YOUR MATERIAL

**Classifications of lumber.** The 2 main classifications of lumber are hardwood and softwood. Hardwoods are cut from deciduous trees like oak, maple, and hickory, which lose their leaves in the fall. The softwoods are the evergreens or conifers like pine and spruce. These terms are slightly misleading, since you will run across hardwoods that are relatively soft and softwoods that are hard. However, in general, hardwoods have smaller pores than softwoods and are relatively harder to dent with fingernail pressure.

*Hardwoods* are more difficult to work with but are more durable than softwoods. The hardwoods also have more attractive grains and take finishes better than most softwoods. They should be used, when possible, where appearance and sturdiness are important factors. The best hardwoods for projects in this book are walnut, mahogany, cherry, oak, birch, and maple, in descending order for working ease, maple being the most difficult to work.

*Softwoods* most frequently used are sugar pine, cedar, fir, and redwood. For general utility indoors, use white pine and sugar pine. Sugar pine is softer and more expensive than white pine. Poplar (frequently called whitewood) and gumwood, though considered hardwoods, will work almost as easily as white pine. Other softwoods, because of their large, riotous grain, often cause difficulties in painting and staining.

All woods contains hundreds of small cells called *pores*. In most hardwoods these pores are very pronounced. Mahogany and oak, for example, have very noticeable pores and are called *open-grain woods*. Birch and maple, on the other hand, have small pores and are referred to as *close-grain woods*.

Manufactured lumber as shipped from the mill to the lumberyard is classified as (1) rough, (2) surfaced, and (3) worked. *Rough lumber* is furry and splintery. It is generally sold to factories or large woodworking shops that can dress their own lumber. *Surfaced lumber* is dressed by running it through a planer machine which leaves the wood smooth. It may be surfaced on 1 side (S1S), 2 sides (S2S), 1 edge (S1E), 2 edges (S2E), or a combination of sides and edges (S1S1E or S1S2E). The lumber you will normally use for home carpentry will be dressed 4 sides (S4S). *Worked lumber* is cut into moldings. Many kinds, shapes, and sizes are stocked by the average lumberyard.

Lumber is sold according to grade and size. For commercial purposes it is standardized under 2 codes, one for softwoods, the other for hardwoods.

*Grades of lumber.* SOFTWOODS: Yard lumber is classified as Select and Common. Each of these, in turn, is graded according to quality—that is, freedom from knots, blemishes, or defects.

Select lumber is generally clear or contains only minor defects which can be covered by paint or other finishes. It is graded A, B, C, and D. Generally speaking, C Select will prove the best buy for you in Select lumber.

Common lumber contains numerous defects and blemishes which prevent its use for finishing purposes, but it is suitable for general utility or construction. It is graded as Nos. 1, 2, 3, 4, and 5. The best buy, No. 2 Common, will keep your waste at a minimum.

HARDWOOD: For hardwood, grades are based upon the percentage of clear cut-

tings that can be obtained from a piece of lumber. Because it is impossible to determine accurately any such percentage, hardwoods are sold in combined grades: Firsts and Seconds, which will give better than 66⅔ per cent; No. 2 Common and Sound Wormy, approximately 50 per cent; No. 3 Common, approximately 33 per cent. Because of the wide variation in grades, great care must be taken when purchasing hardwoods.

*Sizes of lumber.* Lumber has 2 sizes—one is its nominal thickness and width, the other its actual size. Softwoods and hardwoods sold nominally as 1 inch in thickness may vary from 25/32 to ⅞ inch in actual thickness, and a nominal 2-inch width may vary in actual width from 1⅝ to 1¾ inches. Refer to the chart on page 6 for nominal and average actual sizes of stock lumber.

Freshly cut lumber contains a good deal of moisture. As the moisture disappears, the board shrinks somewhat. When the moisture content of a board drops to about 12 per cent, the lumber is con-

CHART OF GRADE REFERENCE FOR BUYING SOFTWOODS

Total products of a typical log arranged in series according to quality as determined by appearance

- Select — Lumber of good appearance and finishing qualities
  - Suitable for natural finishes
    - Grade A—Practically free from defects
    - Grade B—Allows a few small defects or blemishes
  - Suitable for paint finishes
    - Grade C—Allows a limited number of small defects or blemishes that can be covered with paint
    - Grade D—Allows any number of defects or blemishes which do not detract from a finish appearance, especially when painted
- Common — Lumber containing defects or blemishes which detract from a finish appearance but which is suitable for general utility and constructional purposes
  - Lumber suitable for use without waste
    - No. 1 Common—Sound and tight knotted stock. Size of defects and blemishes limited. May be considered watertight lumber
    - No. 2 Common—Allows large and coarse defects. May be considered grain-tight lumber
  - Lumber permitting waste
    - No. 3 Common—Allows larger and coarser defects than No. 2 and occasional knotholes
    - No. 4 Common—Low-quality lumber admitting the coarsest defects, such as decay and holes
    - No. 5 Common—Must hold together under ordinary handling

NOMINAL AND ACTUAL SIZES OF LUMBER (in inches)

| | Softwoods | Hardwoods |
|---|---|---|
| Nominal thickness | Average actual thickness | |
| 1/2 | 7/16 | 1/2 |
| 1 | 25/32 | 7/8 |
| 1 1/4 | 1 1/16 | 1 1/8 |
| 1 1/2 | 1 5/16 | 1 3/8 |
| 1 3/4 | 1 1/2 | 1 5/8 |
| 2 | 1 5/8 | 1 3/4 |
| 3 | 2 5/8 | 2 3/4 |

| Nominal width | Average actual width | |
|---|---|---|
| 1 | 25/32 | 7/8 |
| 2 | 1 5/8 | |
| 3 | 2 5/8 | Usually sold to |
| 4 | 3 5/8 | nearest nominal |
| 6 | 5 5/8 | size at random |
| 8 | 7 5/8 | widths with edges |
| 10 | 9 5/8 | left rough |
| 12 | 11 5/8 | |

sidered seasoned or ready for use. Seasoning is generally speeded by placing the wood in an oven, a process called *kiln drying*. Lumber with a high moisture content is difficult to work with, and when the project is finished and the lumber begins to dry out it will shrink and may open up glued joints and seams and may even crack. For this reason, store lumber in a warm, dry place. Do not let the lumber sag or it will warp and twist out of shape.

**Plywood.** Many of the projects in this book call for plywood. Plywood may be 3-ply, 5-ply, or 7-ply. Thicknesses range from 1/8 to 1 inch, the most common being 1/4, 3/8, 1/2, 5/8, and 3/4 inch. The standard sheet of plywood is 4 x 8 feet, but it is possible to obtain smaller or larger sheets when required.

Plywood is much stronger than wood of comparable thickness, and the large-size sheets eliminate the need for many joints and seams that would be necessary if regular boards were used. There is practically no shrinkage, expansion, or contraction, and the panels possess rigidity and strength in all directions. If well secured, they will not warp.

Plywood is made with a moisture-resistant binder in interior grades, while the exterior grade is waterproof. An almost endless variety of woods, from common fir to rare imported species, are used as the face or top veneer. The cost of the panel naturally depends upon the type of wood used as a face surface.

**Hardboard.** Hardboard is a wood-based product that has many uses. Available in 4-by-8-foot sheets, 1/8 to 3/8 inch thick, it is a dense, hard, grainless material, rich brown in color. It can be cut, nailed, and treated like any large, thin wood panel. The sheets, composed of finely pulverized wood fibers mixed with a binder, are submitted to tremendous pressure to form a tough, moisture-resistant material. Hardboard takes a paint or wax finish very well.

**Estimating materials and costs.** Lumber is measured in various ways, depending upon the type of wood and its width and thickness.

Plywood and hardboard are ordered in square-foot measurements. A piece of plywood 4 by 8 feet equals 32 square feet.

Lumber more than 4 inches wide and 1/2 to 2 inches thick is measured in board feet. A board foot is a square foot of lumber 1 inch thick. To figure total board footage, multiply the thickness of the board in inches by its width and length in feet, or

$$\text{B.F.} = \text{thickness in inches} \times \frac{\text{width in inches}}{12} \times \text{length in feet}$$

LUMBER CALCULATOR—BOARD FEET FOR VARIOUS LENGTHS

| Size in inches | 8-foot | 10-foot | 12-foot | 14-foot | 16-foot |
|---|---|---|---|---|---|
| 1 × 2 | 1 1/3 | 1 2/3 | 2 | 2 1/3 | 2 2/3 |
| 1 × 3 | 2 | 2 1/2 | 3 | 3 1/2 | 4 |
| 1 × 4 | 2 2/3 | 3 1/3 | 4 | 4 2/3 | 5 1/3 |
| 1 × 5 | 3 1/3 | 4 1/6 | 5 | 5 5/6 | 6 2/3 |
| 1 × 6 | 4 | 5 | 6 | 7 | 8 |
| 1 × 8 | 5 1/3 | 6 2/3 | 8 | 9 1/3 | 10 2/3 |
| 1 × 10 | 6 2/3 | 8 1/2 | 10 | 11 2/3 | 13 1/3 |
| 1 × 12 | 8 | 10 | 12 | 14 | 16 |
| 1 1/4* × 4 | 3 1/3 | 4 1/6 | 5 | 5 5/6 | 6 2/3 |
| 1 1/4* × 6 | 5 | 6 1/4 | 7 1/2 | 8 3/4 | 10 |
| 1 1/4* × 8 | 6 2/3 | 8 1/3 | 10 | 11 2/3 | 13 1/3 |
| 1 1/4* × 10 | 8 1/3 | 10 5/12 | 12 1/2 | 14 7/12 | 16 2/3 |
| 1 1/4* × 12 | 10 | 12 1/2 | 15 | 17 1/2 | 20 |
| 2 × 4 | 5 1/3 | 6 2/3 | 8 | 9 1/3 | 10 2/3 |
| 2 × 6 | 8 | 10 | 12 | 14 | 16 |
| 2 × 8 | 10 2/3 | 13 1/3 | 16 | 18 2/3 | 21 1/3 |
| 2 × 10 | 13 1/3 | 16 2/3 | 20 | 23 1/3 | 26 2/3 |
| 2 × 12 | 16 | 20 | 24 | 28 | 32 |

* Sometimes referred to as five-quarter boards.

Thus a piece of lumber 1 by 6 inches by 10 feet would measure 5 board feet—$1 \times \frac{1}{2} \times 10 = 5$. The number of board feet in lumber of various sizes and lengths is shown above in the Lumber Calculator.

Lumber less than 4 inches wide and of any thickness is ordered by the lineal foot. Thus, an order for a board 10 feet long would specify 10 lineal feet.

When you order lumber, make a list of the number of boards you need, their sizes, types, and ultimate uses, similar to the sample list which is included below.

From this list, add all lengths of lumber of similar wood, width, and thickness to get the total footage needed for each type.

You can then estimate costs by multiplying the price per board foot, lineal foot, or square foot by the total footage needed. Because yard lumber is usually sold only in standard lengths, 15 per cent should be added to the estimated cost for additional footage you may have to buy.

SAMPLE LIST OF LUMBER REQUIREMENTS

| Item | Name | No. Pcs. | Size in inches | Wood |
|---|---|---|---|---|
| A | Sides | 2 | $\frac{3}{4} \times 18\frac{3}{4} \times 96$ | plywood |
| B | Back | 1 | $\frac{1}{4} \times 35\frac{1}{4} \times 96$ | hardboard |
| C | Shelves | 4 | $\frac{3}{4} \times 8\frac{3}{4} \times 35\frac{1}{4}$ | pine |
| D | Top | 1 | $\frac{3}{4} \times 18\frac{3}{4} \times 35\frac{1}{4}$ | plywood |
| E | Bottom | 1 | $\frac{3}{4} \times 20\frac{1}{4} \times 35\frac{1}{4}$ | plywood |
| F | Dividers | 10 | $\frac{3}{4} \times 2\frac{5}{8} \times 5\frac{1}{2}$ | pine |
| G | Base | 2 | $2 \times 4 \times 35\frac{1}{4}$ | pine |
| H | Base | 1 | $2 \times 4 \times 18\frac{3}{4}$ | pine |
| I | Trim | 9 lineal feet | $\frac{1}{4}$" quarter round | pine |

## TIPS ON CONSTRUCTION METHODS

**Sawing.** Saws for softwood or fast work have coarse teeth, widely spaced, while those for hardwood and smooth cuts have fine teeth close together. Ordinary crosscut saws—for cutting across the grain—have 10 or 12 teeth per inch. Ripsaws, which cut with the grain, have about 5½ teeth to the inch.

When cutting hardboard or plywood, saw with the good face up, except when using a portable circular saw, in which case the good side is kept down. When handsawing, use a sharp fine-tooth saw without much set. Best results are obtained with a high-speed power saw with little or no set and with as much lead as possible to the teeth. The circular saw should be preferably 10 inches or more in diameter. The piece to be sawed should be fed slowly, with the table adjusted so that the saw extends through the piece only about ¼ to ½ inch. A combination blade is best.

Use a backsaw for accurate tenon cutting, angle cuts, and miter-box work.

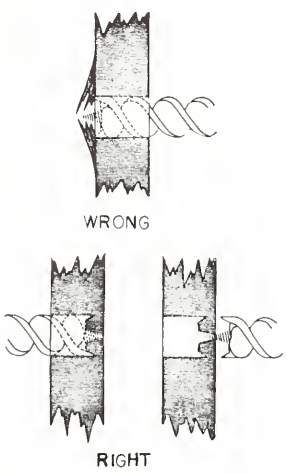



Figure 2–1 Right and wrong way to use auger bit.

**Boring holes.** When using the bit, if it is forced all the way through the wood, splitting will occur on the opposite side (Figure 2–1). To prevent this, pull the bit out as the spur comes through, insert the spur from the opposite side, and complete the hole. This forms a smooth hole on both sides.

Another way to prevent splitting on the reverse side is to clamp a piece of waste wood on the back of the working piece.

Bits should be cleaned, covered with a thin coat of oil, and placed in the toolbox when not in use.

The expansive bit is a drill with an adjustable cutting section. One expansive bit takes the place of several large bits. It has 2 interchangeable cutting blades, one of which cuts holes with diameters from ⅞ to 1½ inches, the other, 1½ to 3 inches.

It is a good rule to test the setting by boring a hole in a piece of waste wood.

The countersink bit with a rosehead point of conical flutes is used for enlarging and tapering the end of a hole. This permits a screwhead to be set flush or to be lowered below the surface of the material.

The screw-driver bit is used to speed up the work of sinking screws in wood or metal. Use care in selecting the bit size; a bit of improper size may damage the screw slot.

The twist drill is used for boring small holes for nails, screws, and bolts. This type of drill is suitable for wood and soft metal but will not stand heavy duty. Drill sizes are graduated into thirty-seconds of an inch, starting at ⅛ inch.

**Chiseling.** Chisels and gouges are generally used to prepare small surface areas

for the insertion of fittings, hardware, wood pieces, and joints. Blade widths range from ⅛ to 2 inches; blade lengths are designated as butt (2½ to 3¼ inches), pocket (2 to 5 inches), or mill (8 to 10 inches).

Types of chisels are the tang chisel, which is worked by hand pressure for light work, and the socket chisel for heavier work where a mallet is needed for greater driving force. The socket chisel has either a so-called firmer blade for light or medium mortising, or a framing blade for large, deep mortising. A sharp and deep cut into the wood should be avoided in favor of numerous small cuts to reach the desired depth.

The bevel of the cutting edge varies between 25 degrees and 35 degrees; the angle is determined by the type of wood to be cut—small-angled bevel for softwood, large-angled bevel for hardwood.

**Nailing.** The length, diameter, head size, and approximate number to a pound of the various penny sizes of common nails and finishing nails are shown in the charts on this page.

A nail must be properly selected for the work it is to do so that it will not split the wood or distort the fibers. The type of nail that distorts the fibers of the wood the least will have the greatest holding power.

In fastening hardwoods, bore holes slightly smaller than the diameter of the nail and to a depth ⅔ of its length. In nailing a board end, blunt the tip of the nail to prevent it from splitting the end. A few staggered nails are stronger than a large number of nails in a row. If one of 2 pieces of wood to be joined is thin, use nails that will penetrate ½ to ¾ of the second piece.

In fine work where the nailhead must not show or must be inconspicuous, it is driven well below the surface with a nail set. The hole in the wood over the nailhead can then be filled flush with the surface, with putty, plastic wood, or sawdust mixed with glue.

Nail sets are made in several sizes, usually 1/32, 2/32, and 4/32 inch, the size being indicated by the diameter of the small end of the tapered shank. The end of a nail set is often "cupped" or hollowed, which prevents it from "walking" or slipping on the nail. Use a nail

COMMON NAILS

| Size | Length | Diameter gauge no. | Diameter of head | Approx. no. per pound |
|---|---|---|---|---|
| 2*d* | 1" | 15 | 11/64" | 830 |
| 3*d* | 1¼" | 14 | 13/64" | 528 |
| 4*d* | 1½" | 12½ | 1/4" | 316 |
| 5*d* | 1¾" | 12½ | 1/4" | 271 |
| 6*d* | 2" | 11½ | 17/64" | 168 |
| 7*d* | 2¼" | 11½ | 17/64" | 150 |
| 8*d* | 2½" | 10¼ | 9/32" | 106 |
| 9*d* | 2¾" | 10¼ | 9/32" | 96 |
| 10*d* | 3" | 9 | 5/16" | 69 |
| 12*d* | 3¼" | 9 | 5/16" | 63 |
| 16*d* | 3½" | 8 | 11/32" | 49 |
| 20*d* | 4" | 6 | 13/32" | 31 |
| 30*d* | 4½" | 5 | 7/16" | 24 |
| 40*d* | 5" | 4 | 15/32" | 18 |
| 50*d* | 5½" | 3 | 1/2" | 14 |
| 60*d* | 6" | 2 | 17/32" | 11 |

FINISHING NAILS

| Size | Length | Diameter gauge no. | Diameter of head gauge no. | Approx. no. per pound |
|---|---|---|---|---|
| 2*d* | 1" | 16½ | 13½ | 1351 |
| 3*d* | 1¼" | 15½ | 12½ | 807 |
| 4*d* | 1½" | 15 | 12 | 584 |
| 5*d* | 1¾" | 15 | 12 | 500 |
| 6*d* | 2" | 13 | 10 | 309 |
| 8*d* | 2½" | 12½ | 9½ | 189 |
| 10*d* | 3" | 11½ | 8½ | 121 |
| 16*d* | 3½" | 11 | 8 | 90 |
| 20*d* | 4" | 10 | 7 | 62 |

set of a size which will not enlarge the hole made by the head of the nail.

**Screwing.** Screws have much greater holding power than nails. They also have the advantage that work held together by them is easily taken apart and put together again without damaging the pieces.

A little soap rubbed into the threads of a wood screw makes it easier to drive.

If a screw is driven in without first boring a pilot hole for the threaded part, the wood may split and in some instances the screwhead may be twisted off. Bore holes for small screws with a small brad awl, for large screws with bits or twist drills. If the wood is soft (pine, spruce, basswood, tulip, etc.) bore the hole only about half as deep as the threaded part of the screw. If the wood is hard (oak, maple, birch, etc.) the hole must be almost as deep as the screw.

If the screw is large or if it is a brass screw, bore a pilot hole slightly smaller in diameter than the threaded part of the screw and then enlarge the hole at the top with a second drill the same diameter as the unthreaded portion of the screw.

Screws are sometimes set below the surface of the wood and concealed by a wooden plug. Plugs can be cut with a tool called a plug cutter, which fits into an ordinary brace. Plugs should be cut from the same kind of wood as that in which they are to be inserted, and the grain should match as closely as possible. They should be cut so that the grain runs across the plug, not lengthwise.

First bore a hole at least ⅜ inch deep with an auger bit the same size as the wooden plug. Then bore the proper pilot and clearance holes. Drive the screw in as far as it will go with a screw driver. Select a suitable plug, put some glue on its sides, and insert it in the hole, with the grain on the end of the plug running in the same direction as the grain on the surface of the work. Drive the plug in as far as it will go. When the glue has dried, use a chisel or a plane to pare the plug off level with the surface. Wood screws are sized according to diameter and length. The length is indicated in inches or fractions thereof; the diameter is indicated by a number. The smallest diameter is No. 0 and the largest common size is No. 24. The most generally used sizes are Nos. 3 to 16.

The method of measuring screws is shown in Figure 2–2. The length of a flathead wood screw is the over-all length, but the length of round- and fillister-head screws is measured from the point to the underside of the head. The length of an ovalhead screw is measured from the point to the edge of the head.

Standards for screws have been established by cooperation between the manufacturers and the U.S. Bureau of Standards so that standard screws of all screw manufacturers are alike. The standard

BODY AND LEAD HOLES FOR WOOD SCREWS

| Screw gauge | Diameter (in decimals) | Body hole drill no. | Lead hole drill no. | Countersink drill no. |
|---|---|---|---|---|
| 0 | .058 | 53 | unnecessary | 32 |
| 1 | .071 | 49 | unnecessary | 20 |
| 2 | .084 | 44 | 56 | 16 |
| 3 | .097 | 40 | 56 | 4 |
| 4 | .111 | 33 | 52 | B |
| 5 | .124 | 1/8 | 52 | F |
| 6 | .137 | 28 | 47 | L |
| 7 | .150 | 24 | 47 | O |
| 8 | .163 | 19 | 42 | S |
| 9 | .177 | 15 | 42 | T |
| 10 | .190 | 10 | 42 | X |
| 11 | .202 | 5 | 38 | 7/16 |
| 12 | .215 | 7/32 | 38 | 29/64 |
| 14 | .242 | D | 31 | 33/64 |
| 16 | .269 | I | 28 | 37/64 |
| 18 | .294 | 19/64 | 23 | 41/64 |

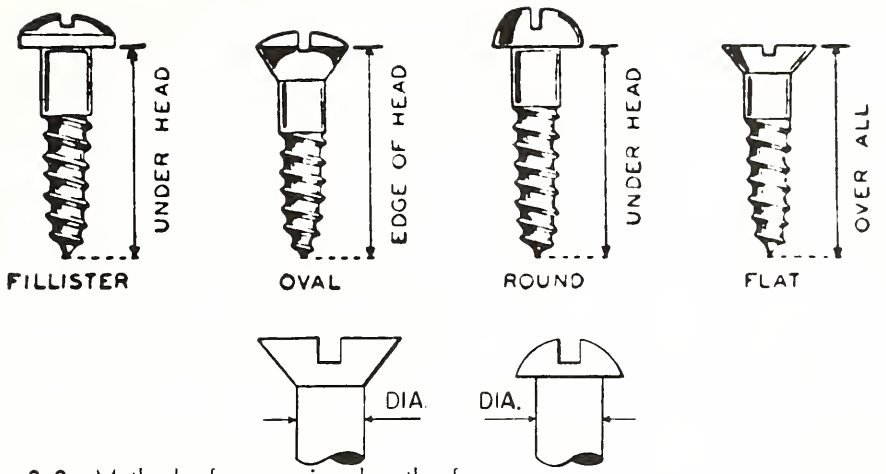



Figure **2–2** Method of measuring length of screws.

diameters are shown in the chart below.

**Use of mending plates.** Metal fasteners, generally called mending plates and angle irons, can be used to reinforce wood joints. Available in many shapes and sizes, they can either be set into the wood or on its face. A mending plate recessed into the wood has more holding power than when placed on the surface. As shown in Figure 2–3, one half is first centered on one member of a joint and screwed in place. The second member of the joint is then held tightly against the first, and the other half of the fastener is screwed fast.

STANDARD WOOD SCREW DIAMETERS

| Number | Diameter | | |
|---|---|---|---|
| | Basic | Maximum | Minimum |
| 0 | .006 | .064 | .053 |
| 1 | .073 | .077 | .066 |
| 2 | .086 | .090 | .079 |
| 3 | .099 | .103 | .092 |
| 4 | .112 | .116 | .105 |
| 5 | .125 | .129 | .118 |
| 6 | .138 | .142 | .131 |
| 7 | .151 | .155 | .144 |
| 8 | .164 | .168 | .157 |
| 9 | .177 | .181 | .170 |
| 10 | .190 | .194 | .183 |
| 11 | .203 | .207 | .196 |
| 12 | .216 | .220 | .209 |
| 14 | .242 | .246 | .235 |
| 16 | .268 | .272 | .261 |
| 18 | .294 | .298 | .287 |
| 20 | .320 | .324 | .313 |
| 24 | .372 | .376 | .365 |

**Gluing.** Glue is the neatest, most durable, and strongest wood fastener when properly used. Glues are classified as hot or cold, depending upon whether heat is necessary to prepare them. Hot glues come from animal parts, are strong, and set quickly with an even consistency. They come in dry sheets or flakes, hard, transparent, and very brittle. Cold types are

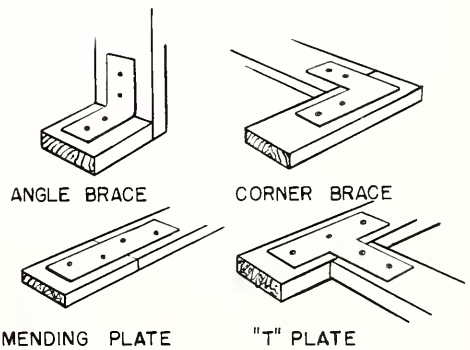



Figure **2–3** Four common types of metal fastenings.

COMPARISON OF GLUES

| | Animal glue | Casein glue | Vegetable glue | Blood | Liquid | Formaldehyde resin |
|---|---|---|---|---|---|---|
| Mixing | water-soaked and melted | cold water | alkali and water, hot or cold | cold water | no preparation | cold water |
| Application | hot | cold | cold | hot | cold | cold |
| Water resistance | low | high or low | low | high | low | waterproof |
| Staining | does not stain | stains certain woods | stains certain woods | does not stain, but shows | does not stain | stainproof |
| Use | joints | veneers and joints | mainly veneer | plywood | repairs small articles | plywood and joints |
| Home craftsman advantages | requires heating equipment, generally not used by beginners | easy to apply, good for beginners | seldom used by home craftsmen | seldom used by home craftsmen | handy for small jobs and quick applications | easy to use and easy to mix, good for beginners |

resin glue, from resin and chemicals, and casein glue, from milk and chemicals; both come in powder form. Regardless of type, be sure to mix according to the manufacturer's instructions. There are also all types of glues ready mixed for immediate use, which may be applied by following the manufacturer's instructions on the container.

Before assembling or gluing any part of a project, carefully inspect each part to make sure that all sandpapering has been completed and that all joints fit properly. Put all the items together (without glue) to make sure that joints come together as they should and that the parts line up and are square and true. Then with a soft pencil clearly mark all companion pieces —as 1 and 1, 2 and 2, etc.; then indicate front right, front left, etc. This is done so that the pieces will fit together quickly without further adjustment, for the time between spreading the glue and application of pressure should not exceed 15 minutes.

Now adjust all hand screws and clamps to the proper size. Carefully inspect the work, for it is not too late to trim a joint a little to make it fit better.

Gluing should be done in a warm, dry room, free from drafts. The glue is applied with a brush to only one of the surfaces to be bonded; this makes the bond between the wood rather than between 2 surfaces of glue. Apply plenty of glue; do not starve the joint. Now apply the clamps; remember to put blocks of scrap wood under the clamps to prevent their bruising the surface. Carefully test the job for squareness and alignment. Then scrape off all excess glue with a chisel. It will help greatly if you throw sawdust

over the glue as it oozes out of the joint; the sawdust absorbs the moisture of the glue, which makes it easier to peel off later. Never wash off excess glue with a cloth and water, since this will coat the wood with a thin layer of glue which may show up when dry. Furthermore, the wetting of the wood will make it swell, and this is very undesirable. Once the clamps are in place and all parts have been tested, the project must not be disturbed for at least 4 to 12 hours.

When it is dry, carefully remove the clamps and start on the final cleaning job. Use a sharp chisel. Holding it with the bevel side up and cutting across the grain (where possible), remove all glue that still remains. Follow this with a thorough sandpapering of all such parts. Give a final sandpapering to all parts of the furniture with fine and then very fine sandpaper.

**Joining wood.** Properly constructed wood joints are essential for most of the projects shown in this book. A well-constructed joint not only adds to the over-all appearance of a piece of furniture but also provides additional support. Sharp cutting tools and accurate measurements and cutting are necessary to produce a really tight joint. Joints commonly used in woodworking are shown in Figure 2–4, and a description follows.

*Butt joint.* This, the simplest of all joints, is made by placing the full thickness of the wood directly against the second piece. It is fastened with nails, wood screws, or dowels. (Doweling, one of the most difficult forms of joining, is discussed on page 15.) If the joint is to be well made, butted ends must be square to face and edges.

*Miter joint.* This joint is made by cutting the 2 ends at angles complementary to each other (usually 45 degrees) and then butting them together. PROCEDURE: Scribe lines on wood with the aid of a try square or T bevel and cut with a backsaw or dovetail saw in a miter box. There are many methods of fastening miter joints, such as corrugated fasteners and dowels. Good miter joints must be clamped and glued.

*Lap joint.* The lap joint maintains a level surface where joints meet. PROCEDURE: Lay out the width of stock to be removed, using a square to mark lines on the faces and edges of both pieces and a marking gauge to mark half the thickness of each piece. On the waste side of your lines, make several saw cuts for easier removal and then cut away the wood with a chisel.

*Rabbet joint.* The rabbet is used in simple drawer and box construction. PROCEDURE: Lay out the width of stock to be removed on the face and then mark the depth of the end cut. Saw on the waste side of your lines. Join the butt piece and fasten with nails or screws.

*Dado joint.* This joint is used for joining shelves, boxes, and drawers. PROCEDURE: Lay out the width of the piece to be fitted. With a backsaw or dovetail saw, cut to the depth line. Remove waste with a chisel. A stopped dado joint is more attractive than a plain dado joint and should be used whenever possible. For best results the dado stop is set 1¼ inches from the front edge. If the waste section near the front edge is removed first, the opening will serve as a depth guide and saw stop.

*Mortise and tenon joint.* This joint is used for joining rails and drawer runners in chests, for joining table legs to frame, etc. PROCEDURE: Mark the tenon by scribing a line on all sides for the shoulder. Mark the thickness of the tenon on end and edges. Remove waste, using a backsaw or dovetail saw. The finished tenon

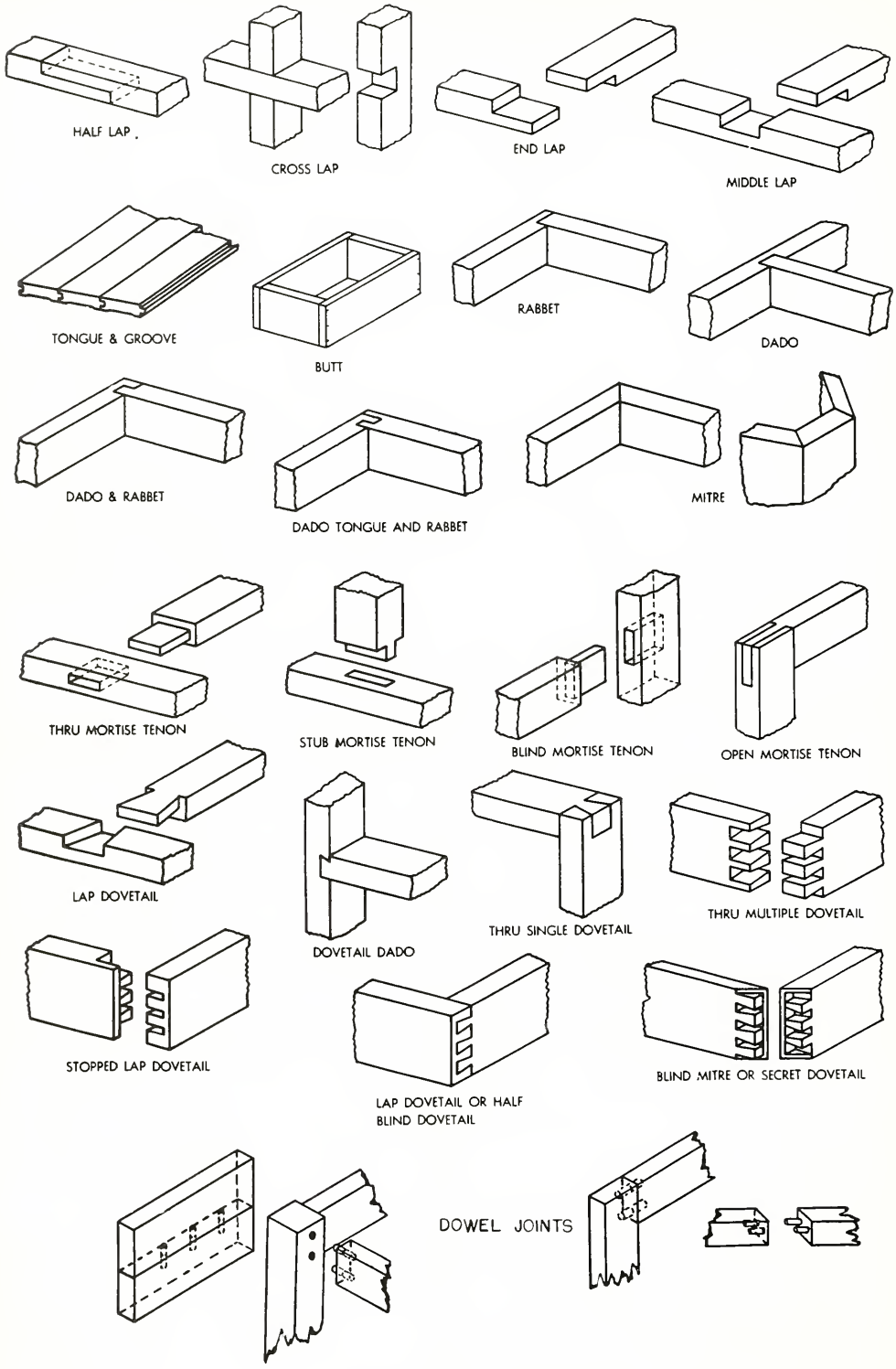



Figure **2–4** Common types of joints. *Courtesy of Stanley Tools.*

is then used as a guide to determine the length and width of the mortise opening. On its center line, drill overlapping holes, starting from each end and working toward the middle. (Use an auger bit smaller than the opening to be made; a stop on the bit will regulate the depth of the drilled holes.) After the holes have been drilled, remove the waste with a chisel, taking care to keep the walls perpendicular to the face of the work.

*Dovetail joint.* This is considered the strongest method of joining 2 pieces of wood. When it has been properly made, the joint is both attractive and durable. PROCEDURE: On a face of one piece, scribe a line parallel to the end equal to the thickness of the piece to be joined. With a try square and knife (or very sharp pencil) lay out a center line perpendicular to the end and crossing the back line. On the front edge and on either side of the center line, mark off ½ inch. On the back line and on either side of the center line mark off ¼ inch. Draw lines between the points to lay out the dovetail. Lay out the front of the pin by scribing square the wood end, then indicate the layout on the bottom face. Remove waste with a backsaw and chisel. Place the piece with its completed pin at right angles to the second piece of wood and mark off the socket. The waste on the second piece is the reverse of that on the first piece; that is, the pin on one piece matches the waste on the other.

If more than 1 dovetail is to be made, continue marking from the front end of the center pin alternately 1 inch, ½ inch, 1 inch, etc., and similarly from the back end. For easier layout, use a T bevel or a template pattern of wood, paper, or tin.

*Doweling.* The dowel joint is really a butt joint. Structurally, the butt joint permits the use of the maximum amount of wood surface that can be joined. The increased resistance offered against heavy downward weight, as well as against sideways movement, makes this joint most desirable. However, methods of fastening the butt joint often detract from the appearance of the finished product. To avoid this, a concealed form of fastening is used—the dowel. PROCEDURE: Place the pieces to be joined side by side. With a square held against a face or edge, scribe a line to mark the position of the dowels. With a marking gauge set for the exact middle of the wood's thickness, scribe lines to locate drill holes. With a center punch or an awl, make a starting hole for the drill. Select a drill bit with a diameter equal to the dowel to be used, and drill out dowel holes in both pieces about ⅛ inch deeper than half the length of the dowel pin. Insert dowels in 1 piece and temporarily butt the 2 pieces together for testing. If the holes have been drilled exactly perpendicular to the joined edge, the joint will be square and the surfaces will be level. If they are not, it may be necessary to start a new dowel-hole location. If the joint is satisfactory, separate the pieces, remove the dowels, and countersink the holes to a depth of 1/16 inch. The purpose of this is to prevent any excessive glue, displaced by the dowels, from forcing the joint apart.

After applying glue to dowels, test the joint with a try square, and clamp tightly. On a large cabinet, a clamp placed diagonally from corner to corner will often square up the joint while a plywood back or wood brace is temporarily fastened.

**Edge-grain treatment for plywood.** Plywood edges can be a problem. If care is not exercised, the finished job will be bonded with raw edges that resemble half-healed scars. First, check the design of the piece to be built. Even with plain butt

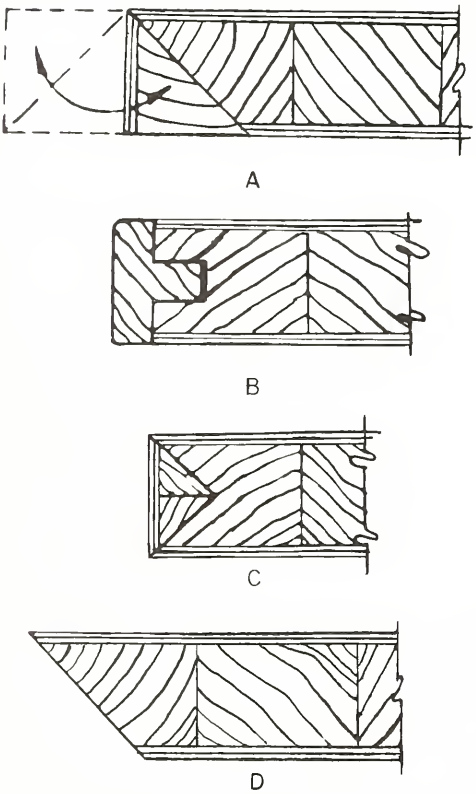



Figure **2–5** Most common edge-grain treatments.

joints, there are an astonishing number of ways to assemble a simple box, and each one makes a difference in the number or position of visible edges. If your shop equipment will make rabbets and miters, a little thought at the design stage will reduce the edge problem. Consider also where the piece of furniture will be located, what surface will be exposed, and what finish you will use.

Possibly the best treatment for edge grain is shown in Figure 2–5, detail *A*. Two 45-degree cuts are made from the underside, completely through the wood, the small piece is removed, and the end is bent as shown. By this method a continuous grain is shown even on the ends.

A solid piece of material—that is, solid hardwood—in the shape of a T in cross section can be forced and glued to the piece of plywood so that, when the edge is viewed, it will appear as solid lumber (detail *B*). The procedure shown in detail *C* is the same, except that the piece of lumber is triangular in cross section.

Cutting the edge at an angle, as shown in detail *D*, is a neat and cheap method; the edge grain may be painted or stained to match the panel.

It is also possible to bead the edge (Figure 2–6, detail *A*) or to glue a beading strip or molding to the edge (detail *B*). A mitered framing strip, secured by

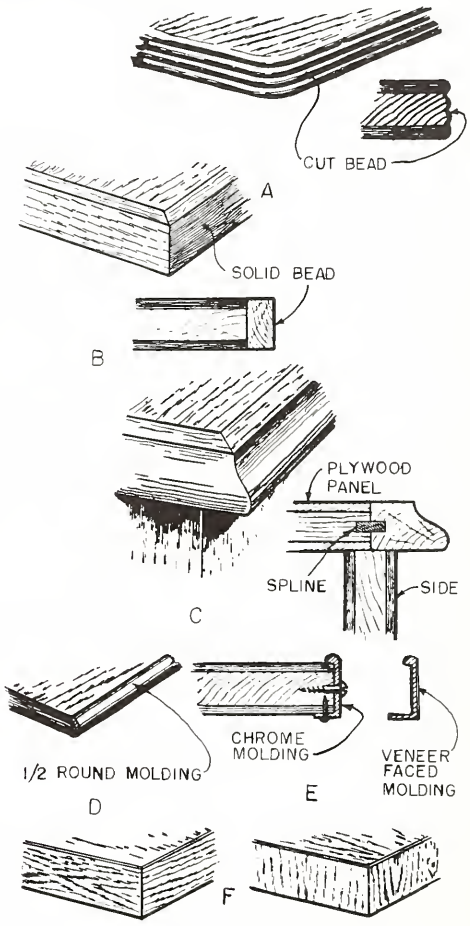



Figure **2–6** Other types of edge-grain treatment. *Courtesy of United States Plywood Corporation.*

glue and by brads that have been set and puttied, is a very effective treatment, especially for table and desk tops. Shaped molding, either bought or made up in the shop, is also good for the exposed top edges of a desk (detail *C*). Do not overlook common half- or quarter-round molding (detail *D*); its width may be greater than the edge width. Aluminum veneer cap molding may also be used (detail *E*). Detail *F* shows the use of thin veneer grooved to the edge grain.

**Hardware installation.** The varieties of cabinet hardware are almost unlimited, so only the typical varieties used on kitchen cabinets, built-in cabinets, and similar pieces are covered here.

*Hinges.* Hinges suitable for kitchen cabinets are of 2 kinds. One group is made for lipped, rabbeted, or offset doors like those shown in Figure 2–7, details *A* and *B*, while another group is intended for flush doors, as shown in *C* and *D*. Both kinds of hinges are available in either the visible or the semiconcealed variety. *A* and *D* are hinges of the semiconcealed type: that is, only half the hinge, or 1 leaf, can be seen from the front of the cabinet. One leaf is fastened to the stile, or upright, of the cabinet, while the other leaf is attached to the edge or to the back face of the door. The hinges shown in *B* and *C*, both leaves of which can be seen from the front of the cabinet, are of the visible type.

Full-mortise, loose-pin, bullet-tip butt hinges are well designed for modern cabinetwork. Where 2 dimensions are given for butt hinges, the first always indicates the length of the joint, not including the tips; the second dimension indicates the full width when the hinge is open. The size of a hinge, within certain limitations, has no relation to its weight or strength. The latter depend upon the gauge and kind of metal used. Figure 2–8 shows the steps in installing a butt hinge.

Drop-leaf hinges, shown in Figure 2–9, are used in good furniture construction for drop leaves of tables and cabinets. The longer half of the hinge must be long enough to reach across the joint and

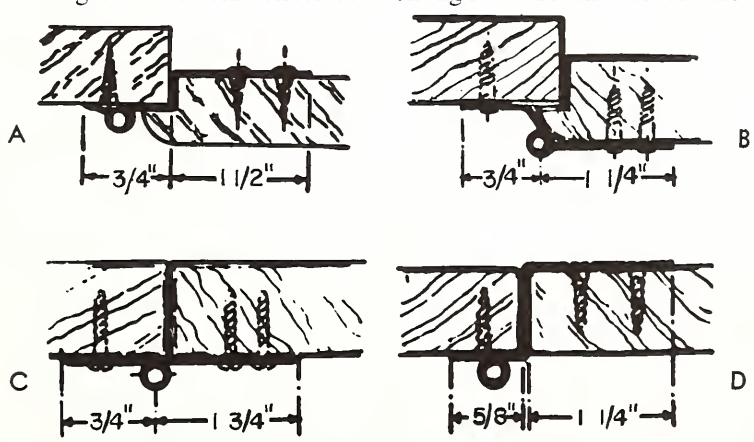



Figure **2–7** Kitchen cabinet hinges. *Courtesy of Stanley Tools.*

**A** Semiconcealed offset-door type
**B** Visible offset-door type
**C** Visible flush-door type
**D** Semiconcealed flush-door type

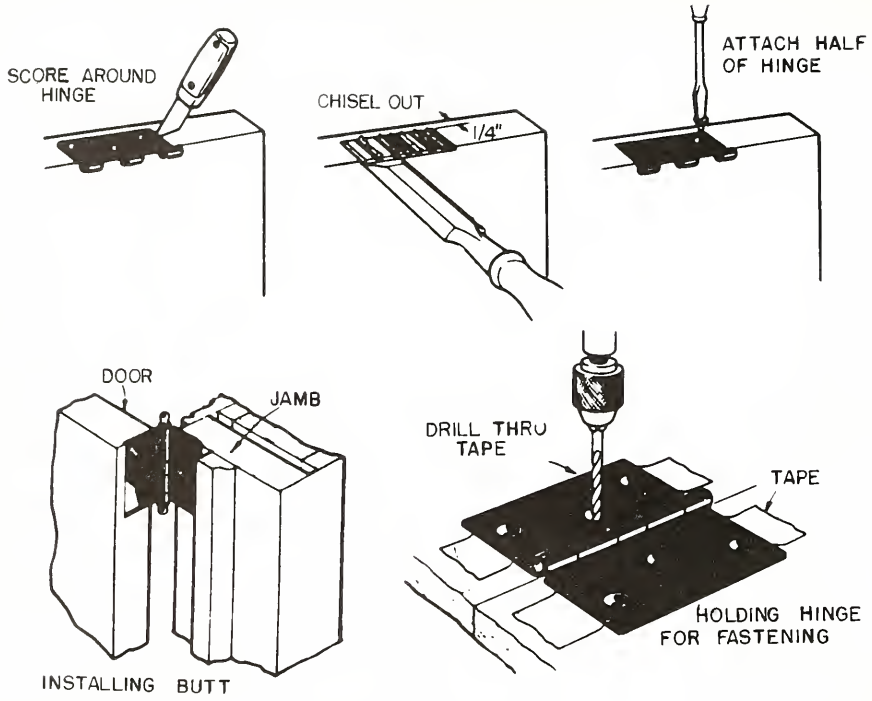



Figure **2–8** Fitting a butt hinge. *Courtesy of Stanley Tools.*

have the screws set in the drop leaf as shown in the sketch. The center pin is in line with one face of the hinge, so that it may be set without gaining or cutting out for the whole hinge; however, it is necessary to gouge out a groove for the hinge joint. When these hinges are set, the center line of the pin must coincide with the center of the arc which marks the rule joint.

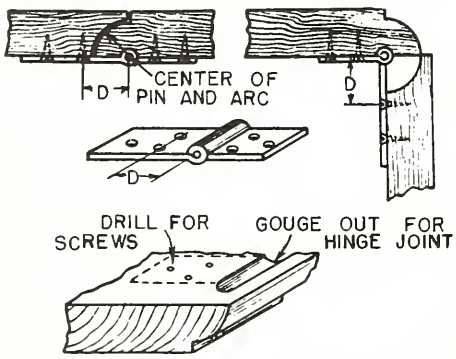



Figure **2–9** Drop-leaf hinges. *Courtesy of Stanley Tools.*

Figure 2–10 shows 2 types of concealed hinges. While these hinges are not entirely invisible, only the edges of their thin joints show when the door is closed. Detail *B* illustrates the setting of these 2 types of hinges. One half of the hinge is set in a grain cut in the top or bottom edge of the door, while the other half is set in the frame.

Invisible hinges (Figure 2–11) set in

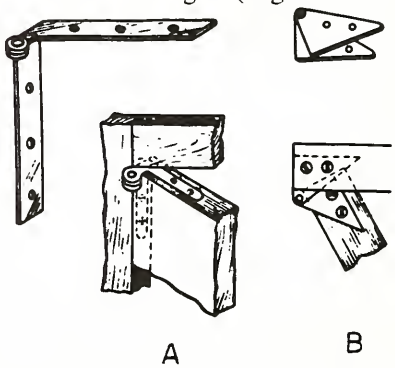



Figure **2–10** Concealed hinges.

the edge of the door and frame are entirely invisible when the door is closed. They come in a variety of sizes, with the length of the plates ranging from 1 to 5 inches, and the width from ⅜ to 1⅜ inches. The mortise is roughly cut out with a brace and bit, the remaining waste stock is removed with a chisel, and the hinge attached.

*Hanging cabinet doors.* First, plane the hinge edge of the door true. Then square the top and bottom edges to fit the opening. Finally, plane the edge opposite the hinge joint. This edge should have a slight bevel to give clearance when closing the door and thereby make possible a tighter fit. Wedge the door up from the bottom, by forcing a chisel or screw driver under it, until it almost touches the top of the opening. Using the hinge itself, lay out its position on both door and frame. Check the door for smooth operation.

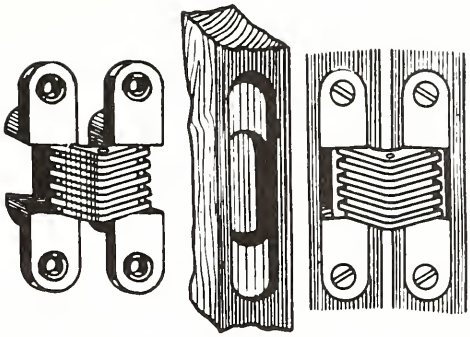


Figure **2–11** Invisible hinges. *Courtesy of Soss Manufacturing Company.*

*Catches.* Various kinds of catches are shown in Figure 2–12. Probably the oldest and most common is the elbow catch, which is screwed to the back of the

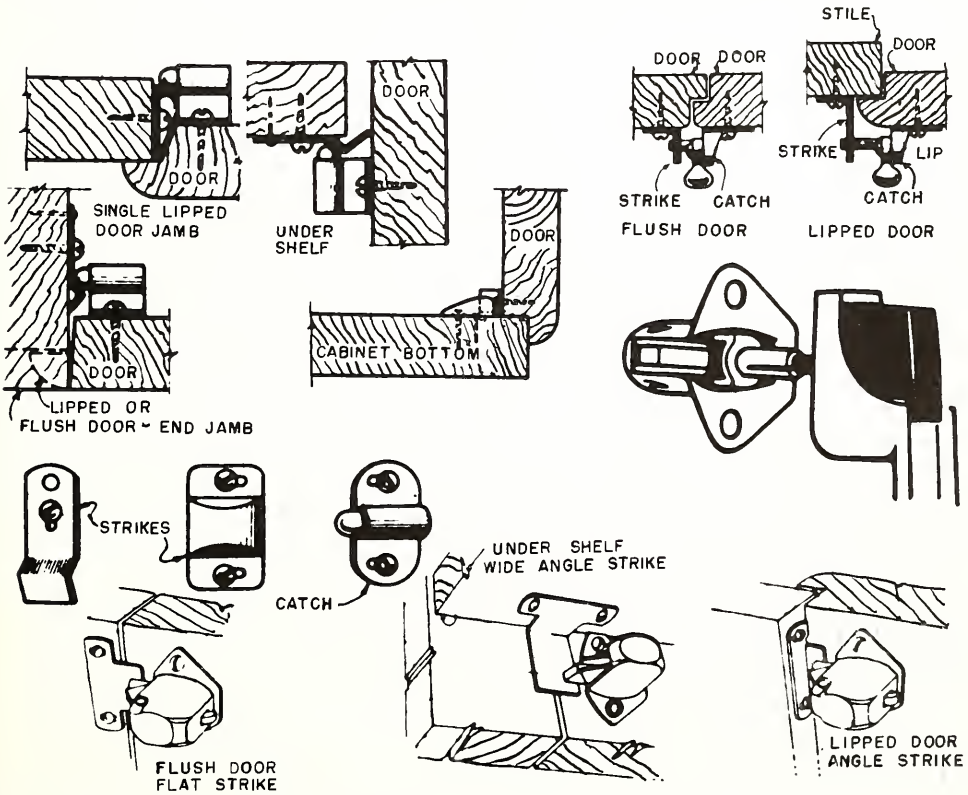



Figure **2–12** Various kinds of catches. *Courtesy of Stanley Tools.*

door. All the catches shown are spring catches which are released by pulling the door, except for the elbow catch, which must be manually released before the door can be opened.

A newer type is the friction catch. Some friction catches are easily applied, being simply screwed in place, while others must be set in holes that are bored for them.

Drawer pulls and knobs are never applied to furniture until after the finishing is complete. This makes it easier to do the finishing, since they are not in the way. Complete details on finishing can be found in Chapter 12.

# CHAPTER 3

## REMODELING PROBLEMS AND THEIR SOLUTION

THE HOMEOWNER who is handy with tools can remodel a living room, kitchen, bedroom, attic, and basement at minimum expense. This chapter describes basic techniques for general remodeling. Many of them are referred to in connection with specific room projects (Chapters 5 to 11).

## WALLS

Seventy per cent of what you see when you enter a room is walls and ceiling. It is important, therefore, to keep these interior surfaces in good repair and pleasing in appearance.

**Repairing cracks.** With plaster walls, the patching of cracks and holes is the most common repair needed. Cracks generally appear as a result of the settling of the foundation or wall support, or the sagging, warping, or shrinking of studding or joists. Do not repair until settling has ended, which in a new house may not be for a year. At the first sign of cracking, make pencil marks at the tip of the crack, and new marks as cracking continues. If the crack develops no more after a month or two, it is safe to assume that a patch can be made.

Small surface cracks are easily filled. Just wet them down and then fill with patching plaster, spackle, or plaster of Paris. To make the plaster hold, it may be necessary to undercut the crack slightly with a beer-can opener or other sharp-pointed tool.

Large cracks or holes must be cleaned out so that no loose plaster remains. Then undercut the edges with an old chisel so that the patch will be slightly larger at the back than at the front. This locks the hardened patch in.

When filling in a large hole it may be necessary to anchor the patch. This is done by cutting a piece of wire screening to fit the hole and tacking it to the exposed lath with a few brads. Where gypsum lath board serves as the plaster base, simply clean out the hole or crack down to the board surface, then undercut the edges of it to lock the patch in place.

Mix the plaster as directed on the box. Never mix more plaster than you can use in 30 minutes. Before you apply the patch, thoroughly wet down the edges of the old plaster and the exposed lath. If this step is neglected, the old plaster will draw water out of the patch, causing the patch to shrink and crack.

To do a satisfactory job on a deep hole or crack, you should apply patching material in 2 coats. The first, called the *scratch coat*, can be worked into place with a wide-bladed putty knife. Push the wet plaster into the breaks and finish it off about ⅛ inch below the level of the finished surface. When the scratch coat has dried, wet down the area and then apply a thin coat of plaster, smoothing it into place with a trowel. Avoid leaving a powdery edge of plaster extending out over the old plaster.

Sandpaper the patch level, when dry, with a fine piece of sandpaper held over a block of wood. Before refinishing the patch or wall, mix a thick glue size (obtainable at paint and hardware stores) and seal the patch. If this is not done, it is possible that the patch will absorb paint at a different rate from the surrounding wall, making the patch visible no matter how smooth it may be.

Stippled effects and similar special finishes can be duplicated by going over the patch with a stiff brush, a piece of carpet nailed to a block, or other suitable tool, before the plaster sets. If a patch must be colored to match the wall, dry colors sold for the purpose can be mixed with the plaster. To give a wall a sand finish, mix 1 to 3 parts of fine sand to 4 parts of plaster in the final coat. Add water and allow the mixture to set for 15 minutes before using. Apply in the manner described above.

To repair a hole in wallboard or plasterboard, enlarge the opening horizontally so as to include the 2 adjacent studs as far as their centers. Next, square off the top and bottom limits of the break and insert headers or crosspieces between the studs at these points. As their purpose is to provide a sound nailing base, the headers should be cut from 2-by-4-inch lumber and nailed securely in place. Then insert the patch and nail both it and the adjoining wallboard to the framing.

To conceal the joint around the patch, sand down the surfaces of the boards so as to form a slight depression running about 2½ inches each way from the joint. Then hold one end of wallboard tape over the joint and, with a wide-bladed putty knife, apply the bonding cement recommended by the wallboard manufacturer. Work the cement to a feather-edge on both sides, and level off the surface.

**Replacing tiles.** To replace a tile that has worked itself loose from its base, clean all cement off the back of the tile and from the cavity in the wall. Soak the tile in water. Make a thin paste of plaster of Paris and the white of an egg or buy a tile-bonding compound at your local hardware store. Spread the paste lightly on the cavity and on the back of the tile. Set the tile firmly in the cavity, wipe off any excess paste, and allow to dry. The joints around the tile are then filled with a grout consisting of a little Portland cement and water mixed to the consistency of light cream. Use a nailhead, a piece of rod, or other improvised instrument to finish the grout. Broken tiles are replaced in the same manner.

**Hanging wall objects.** A problem that confronts many homeowners is where and how to hang objects from a wall without damaging it. Nails, for example, will hold in plaster or wallboard walls only when driven through the paster or board into one of the wall studs. To locate a stud, tap the wall very gently with a hammer and listen carefully to the sound. The reverberation will be hollow in tone except where the studs are located. You can also locate the studding by examining the baseboard for nailheads. The base-

board is nailed directly to the studding, and you are fairly certain to have a solid wood base behind the plaster along a line drawn straight up from the nailheads in the baseboard.

For composition board or plaster surfaces, mark with a pencil the exact spots where screws are to be placed and cover the marks with transparent Scotch tape. Then drill the holes into the plaster with a gimlet or small power drill. The tape keeps the plaster from cracking.

If it is necessary to fasten anything to a plastered wall where no stud can be found, use a toggle bolt. To install this bolt, drill a hole through the plaster slightly larger than the diameter of the wing nut itself. Then attach to the toggle bolt the object to be held in the wall, and slip the bolt through the hole with the wing nut closed. When the wing nut is in the open space behind the plaster, it will spring open and will press against the plaster from within when the bolt is tightened. If the object is too heavy for 1 bolt, as in the case of the wall cabinet, fasten a wood strip to the wall with several toggle bolts, then hang the object on the strip.

Another type of fastener is a Molly, which permits the bolt to be removed, replaced, and retightened without having the nut drop down inside the wall, as in the case of the toggle bolt. To install a Molly, drill a hole large enough for the bolt through the plaster. Then push the bolt through the wall with your thumb. The piece to be hung on the wall does not have to be attached in advance, as with the toggle bolt. Once through the wall, the slotted bolthead is turned to tighten the unit, drawing the "knees" of the outer shell up snugly against the inside of the wall. The bolt may then be removed and replaced whenever desired. A flat wrench, available with Molly bolts, is used when the material is of a type that may permit the outer shell of the Molly to slip around and slow up the job when the inner bolt is turned.

For masonry surfaces—brick, stone, concrete, etc.—the drilling problem can generally be solved with a star drill or a carbide-tip masonry bit in an electric hand drill. Drill the holes into the brick, concrete block, or stone—not into the mortar joints between. Although holes go faster and easier into the mortar joints, the fastener will have much less strength.

One of the strongest masonry fasteners that you can use is the lead anchor. It is available in sizes ⅛ inch to 1½ inches in diameter and can be used only with screws, not with nails. Insert the anchor in a drilled hole in the masonry. Then drive the holding screw into the anchor; as the screw goes in, it expands the anchor and holds it rigidly in the hole.

Rawlplugs will hold either screws or large nails. They are made of a tough composition material and are available in sizes ⅛ inch to 3 inches in diameter. To install a Rawlplug, drill a hole the same size as the plug and tap the plug in slowly until it is flush with the surface. With the Rawlplug in place, drive in the screw or nail.

For maximum strength with either lead anchor or Rawlplug, use a screw the same diameter as the plug—that is, a ⅜-inch screw in a ⅜-inch plug.

**Cutouts in the wall.** A modern decorative trend—and a spacesaver, too—is to build bookcases, cabinets, and niches into a wall. The vertical 2-by-4-inch studs which back up the average wall are usually fastened on 16-inch centers, which means that, since they are 1⅝ inches thick, they are spaced 14⅜ inches apart. After you have located the studs, mark on the wall the dimensions of the proposed cabinet, with due allowance for 2-by-4-inch

headers which must be nailed horizontally across any severed studs.

Cut through the plaster along the dimension lines with a cold chisel or an old wood chisel and a hammer. To prevent jagged edges, hold a straight board along the line. Chisel the horizontal line for the header along the nearest interval between the laths. Then bore large starting holes at the upper corners. With a coarse compass saw (it will bind less than the ordinary handsaw) cut across the laths down the vertical lines chiseled in the plaster. (Metal lath can be cut with metal-cutting snips.) The lath and plaster within the opening can now be removed. Any exposed studs which you wish to remove are sawed horizontally at both points.

The built-in niche cannot be deeper than the width of the studding plus the lath and plaster wall. It should be constructed to fit snugly between the headers and the studs, to which it can be fastened with finishing nails. The edges may be finished off with molding.

**REPLACING AN OLD WALL.** When plastered or wallpapered walls reach a condition where an entire room must be done over, or when you want to change the appearance of a room, it is well to consider the installation of plywood, wallboard, or gypsum board. The methods of using these and other wall materials are described below.

**Plywood.** One outstanding advantage of plywood for interiors is the elimination of periodic patching of cracks. Plywood is crackproof and, when properly installed, will outlive the house. When plywood is used unpainted, the only upkeep required is an occasional waxing, so that the first cost is the last. Because it comes in large sheets, 4 feet wide and 8 feet long, a wall can be erected quickly and easily with ordinary hand tools.

Selecting a wood is a matter of personal taste and price. For economy, fir plywood can be used with the prominent grain subdued (see page 234). Handsome hardwood plywood such as oak, knotty pine, gum, birch, mahogany, or walnut should be finished naturally. Striated plywood, with its textured surface, may be left natural, stained, or painted. If plywood is to be painted, use fir panels or utility-grade gum.

The basic principle of paneling is illustrated in Figure 3–1. The vertical joints are first lined up with the openings, then the plain wall spaces are divided into orderly pattern arrangements. Panels are

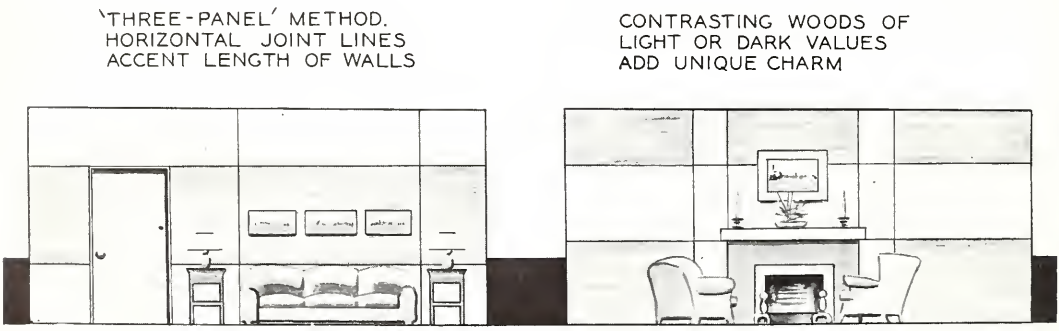



Figure 3–1 Wall panel treatments.

installed both horizontally and vertically, allowing the joints to show in frank recognition of the paneling. Note how the panels are run horizontally above the fireplace and vertically on either side of it. A combination of vertical and horizontal arrangements may be used in the same room with pleasing effect.

After deciding on the panel arrangement, furring strips should be applied to the wall as shown in Figure 3–2. Two-inch-wide strips of ¼-inch 3-ply fir plywood, or 1-by-2-inch wood furring strips, are ideal for this purpose—except where there are recess joints (see Figure 3–4, details *C* and *F*). Apply furring horizontally across the studs, nailing it into the studs. Then put on vertical furring wherever required to provide a nailing surface behind all panel edges. Check with a level and plumb bob to be sure all furring is plumb and true. Where necessary, shim or build out the furring with

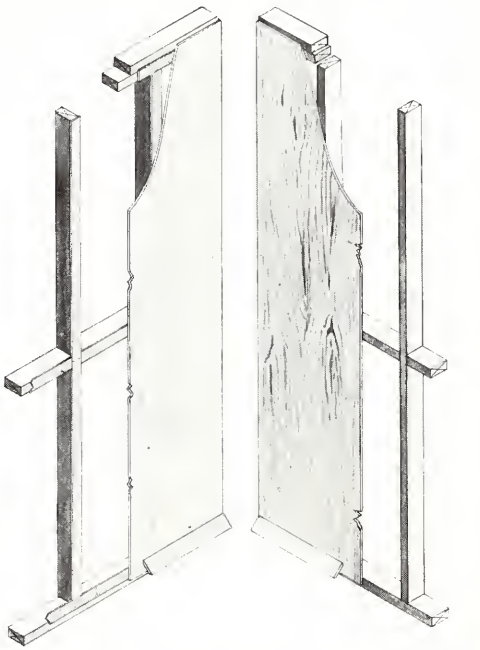


Figure **3–2** Framing details, showing studs and furring strips (shaded).

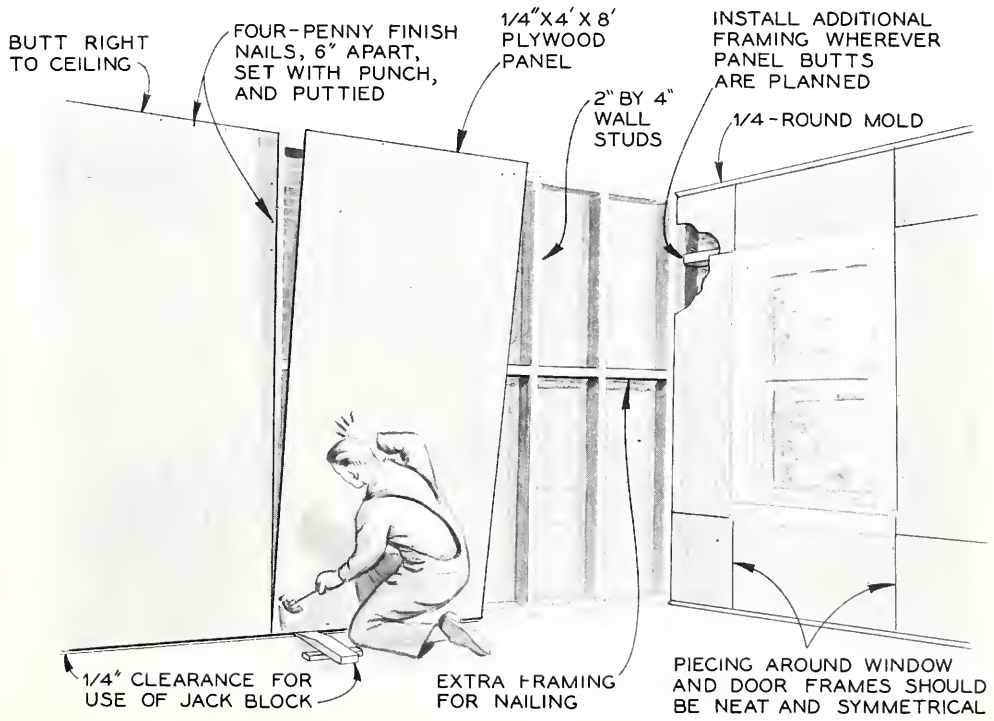



Figure **3–3** Applying paneling to a wall. *Reprinted from* Mechanix Illustrated.

small blocks or strips of wood. The furring is nailed through the plaster into studs with 8*d* common or box nails.

To prevent moisture from penetrating through the panel to the face, back-prime all panels erected over exterior plaster walls with 1 coat of pure white lead and linseed oil. Avoid getting any of the primer on the face of the panels. After the furring has been applied and the back-primer has been allowed to dry, the panels are ready to be put up.

When paneling, start in one corner of the room and work around. Be sure that the panels are square with the adjacent walls and ceiling before nailing. Keep the bottom of each wall panel about ¼ inch above the floor to allow space for the lever used to pry the panel tightly against the ceiling (Figure 3–3). For a durable job, use glue as well as nails to fasten plywood to studs or furring strips, since this makes the wall a rigid, continuous unit. Cover the framing members with a good casein or cold-resin glue; secure the panels in place with 4*d* finishing nails or ¾-inch No. 19 brads driven 6 inches apart; set the nails; and fill with plastic composition wood.

Panel joints, which are important and should be given much thought, are illustrated in Figure 3–4. Treatment at floor

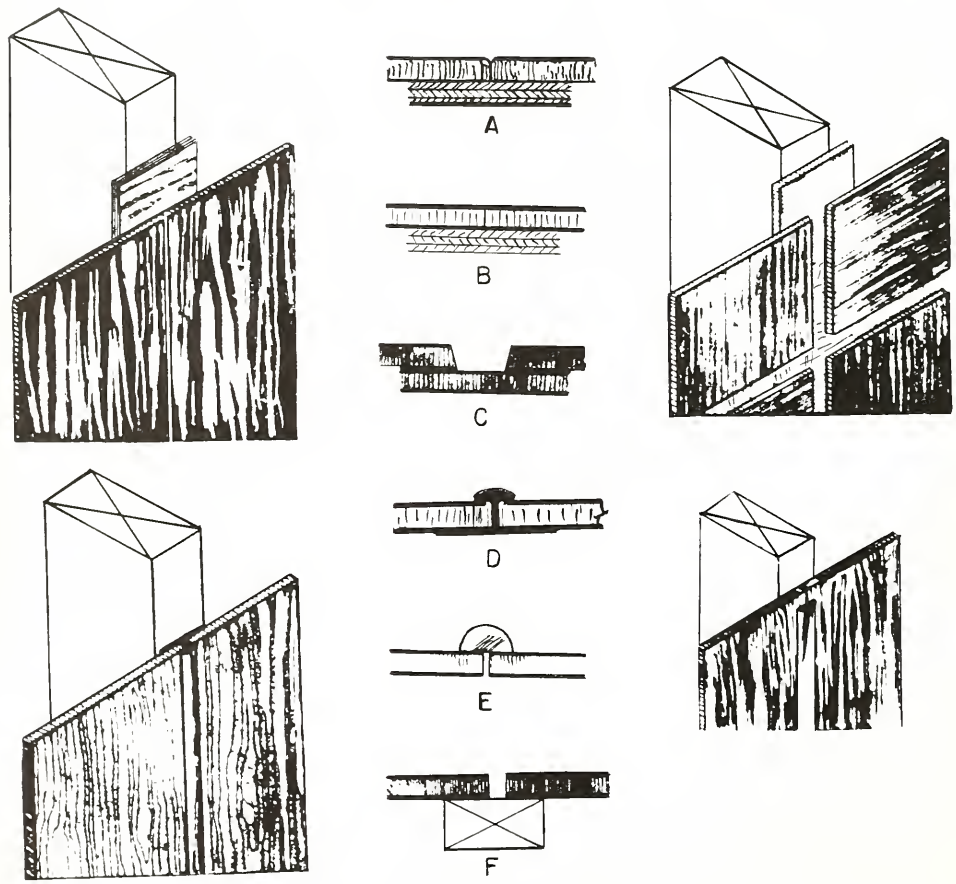



Figure 3–4 Panel joints. A. V joint. B. Butt joint. C. Block treatment joint. D. Aluminum molding divider strip. E. Batten joint. F. Open recessed joint.

and ceiling is shown in Figure 3–5, and corner joints in Figure 3–6. What you do around doors and windows depends upon the conditions you meet. Often it is possible to fit the plywood right up to the openings and get along without casings on top of the plywood. Or you can fit the plywood up to the casings, leaving them in place.

In new construction, as in an attic, plywood panels may be nailed directly to the exposed 2-by-4-inch studs. Here also you can use either 4*d* finishing nails or No. 19 brads with glue.

**Plywood plank.** Prefinished ¼-inch hardwood plywood planks called *Plankweld* are available and require no painting or staining on the job. They have clean overlapping edges that make a wall look really modern and distinctive. These panels are 8 feet long by 16 inches wides and they go up without furring strips—over wallpaper, plaster, sheathing, or right over bare studs. The panels are grooved on the long edges, in a special design that

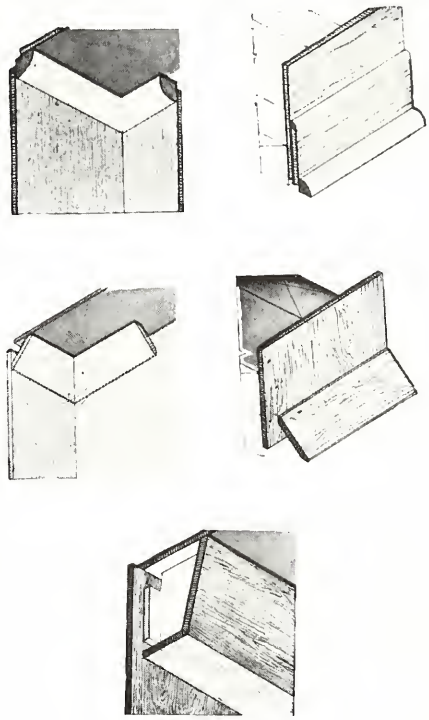


Figure **3–5** Treatment of base and ceiling. *Courtesy of United States Plywood Corporation.*

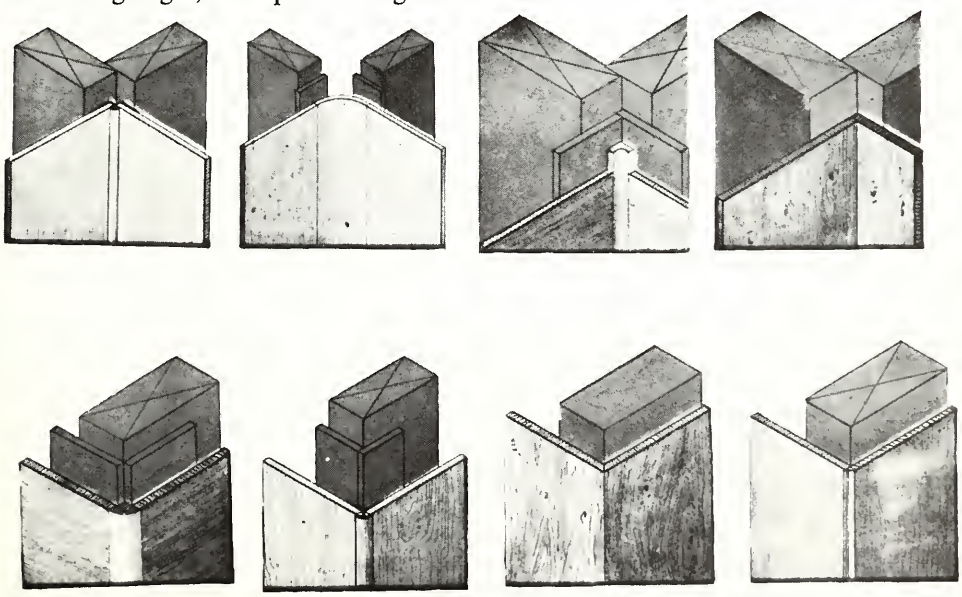


Figure **3–6** Treatment of corner joints. *Courtesy of United States Plywood Corporation.*

makes the installation quickest of all plywood walls. The material is held by special clips that you nail into the wall or studs. You put the first panel in place, nail on the clips, then slide the next panel into the first one (see Figure 3–7). Use a 4*d* common nail or a 3*d* wood lath nail through the hole in each metal clip. Nail the clips in place about every 19 inches down the edge of the panel, using 6 clips per panel.

When the boards are installed over an existing plaster wall, furring strips are not needed provided the plaster has sufficient nail-holding power. If in doubt, apply furring strips horizontally on approximately 19-inch centers. Use ¼-by-2½-inch plywood or 1-by-2-inch wood furring strips. In most cases, all existing molding should be removed before the planks are applied.

When plywood planks are used in new construction, place studs on 16-inch centers or apply 1-by-2-inch furring strips horizontally on the face of the studs at levels where clips are to be installed.

**Wood paneling.** Wood paneling made with knotty pine in random widths is easy to install and makes a beautiful room. The secret of successful wood paneling is to vary the widths so that they are truly random, with no recurrent pattern or sequence. It is wise, however, to arrange

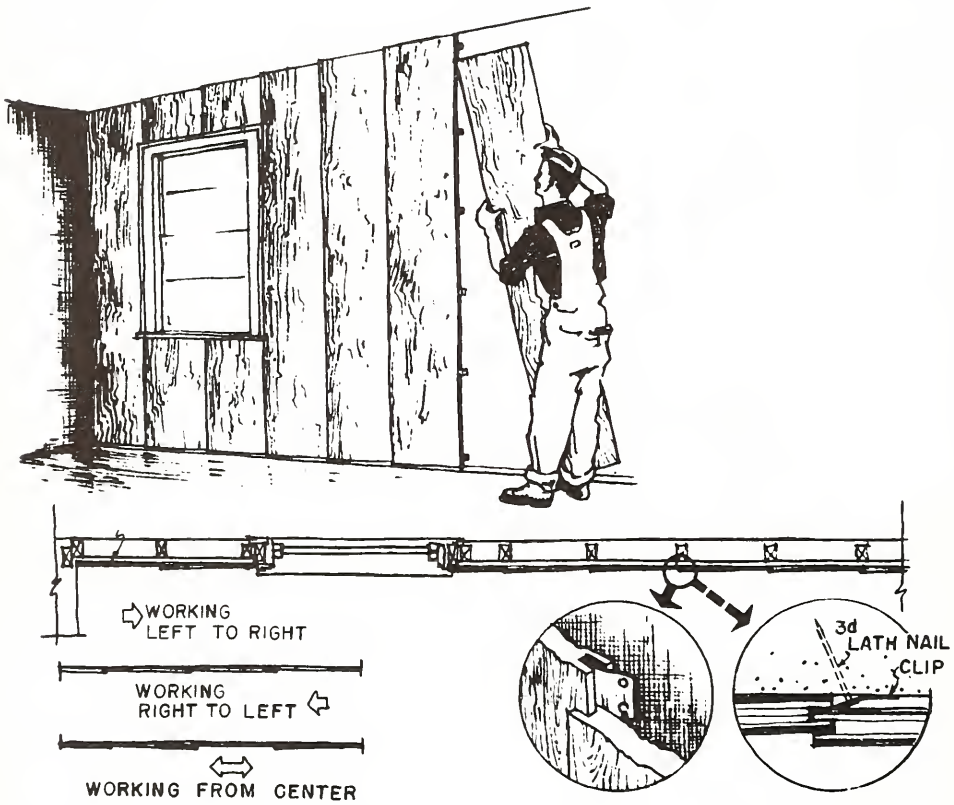



Figure **3–7** Installation of plywood planks. First decide in which direction you desire to have the panel overlap, and install the first panel. Then, after securing panel to wall by means of clips, install the next panel. Always engage panels starting at the top, as shown. *Courtesy of United States Plywood Corporation.*

the widths so that they join or meet at the studs or furring and can be secured by concealed nailing along the tongues, as in flooring. Use finishing nails on the surface of the boards, countersink them, and later, after the stain has been applied, putty or beeswax the holes. This prevents warping of large boards. To ensure a satisfactory effect with random-width boards, mark the location of each board before nailing it in place. In making the layout, locate boards of equal width on either side of a window or door, as well as at outside or inside corners. This leaves the area between to be divided among the available widths.

In new work, wood paneling may be nailed to studs or furring in the same manner as plywood (page 25). A right-handed worker will prefer facing the tongues to the right and working from left to right, starting with a length nailed to a corner studding or furring. The boards which fill the space to the next stud are then laid out and cut to proper length, the preceding one being used as a template to make sure that all are the same length. Each tongue should be fitted tightly into its groove by rapping it smartly with a hammer insulated by a tongued scrap of the wood. The boards between those anchored to studs can be secured to the top plate near the ceiling and to the shoe close to the floor. Warped lengths should be discarded. Use only full-length pieces that extend from floor to ceiling, except where the wall is masked by bookshelves or other built-ins. Corners must be solid, which will usually require ripping at least 1 board for its full length to take off the tongue. The top of the paneling can be finished with a suitable cove or crown molding. For a top finish, see Chapter 12.

**Insulation board.** Insulation board or wallboard is available in the form of planks and sheets. The plank is 8, 12, or 16 inches wide by 8, 10, or 12 feet long. The sheet is 4 feet wide by 6, 7, 8, 9, 10, or 12 feet long. Both are usually prefinished by the manufacturer; therefore, when installing be sure not to dirty them more than necessary. They can be used very successfully in finishing off an attic because of their insulating value, plus their ease of handling. They are low-cost and can be painted or left natural.

For vertical application of planks, nail 1-by-3-inch furring strips horizontally on wall studs. For ½-inch-thick plank, space strips 9 inches on centers up to shoulder height and 12 inches on centers above this height. For ¾-inch plank, space strips 12 inches on centers up to shoulder height and 16 inches on centers above this height. Determine the position of the planks first to ensure proper arrangement of joints around door and window openings, at corners, etc.

In horizontal application, the framing should be furred horizontally with 1-by-3-inch strips. Space the strips to conform to the width of the plank so that there is a nailing base at every joint. If 12- or 16-inch-width plank is used, it is advisable to put an extra furring strip back of the center of each plank up to a height of about 5 feet.

Plank may be applied to gypsum wallboard or plaster that is sound, reasonably level, and dry. Use adhesive and supplementary nailing along the joints. Space nails approximately 16 inches on centers. The backing must be such as to hold the nails securely. If the plaster is not sound, apply a nailing base of furring strip. Plank may be applied to plywood or other continuous wood backing without the use of adhesives, since nails alone will give sufficient security. Masonry surfaces such as concrete, whether plastered or unplastered, should be furred, with no adhesive used.

Nail through the thickest part of the tongue of the plank and as close to the bevel as possible, with heads flush. For ½-inch plank use 1-inch No. 17 flathead brads, spaced to match the furring or, for application to continuous backing, spaced 12 inches on center. For ¾-inch plank, use 1¼-inch No. 17 flathead brads. For face nailing at wall and ceiling junctures use 1¼-inch No. 16 brads or finishing nails, for ½-inch plank; for ¾-inch plank, use 1¾-inch nails. Start wall application of plank in one corner of a room, face-nailing at wall junctures. The tongue edge of each plank should always be the leading edge to permit nailing. The exposed nailheads should later be covered with a suitable molding unless inconspicuous finish nails are used. Edges of a ceiling application of plank should be nailed in the same manner. Instead of nails, 9/16-inch cement-coated staples may be used, placed as close to bevel as possible.

Where adhesive is to be used on continuous surfaces which are covered with calcimine or cold-water paints, it is advisable to remove the paint. Loose or chipped paint should be scraped off and grease or dirt should be removed with a strong washing-soda solution followed by clear-water sponging. Let the surface dry thoroughly. Apply 2- to 3-inch spots of adhesive at about 12-inch intervals along the edges of the plank, and also down the center if the plank is as much as 12 or 16 inches wide; or apply ribbons of adhesive 2 to 3 inches wide along the edges, with an intermediate ribbon in the center of 12- or 16-inch-wide plank. Drive nails through the thickest part of the tongue as close to bevel as possible, with heads flush.

For sheets, the framing members (studs, joists, or furring strips) should be spaced 16 inches on centers for ½-inch board. For ¾- or 1-inch-thick panels, space furring 16 or 24 inches on centers. Over a rough or irregular surface, or a masonry or poor plaster surface, install strips properly shimmed. On gypsum or plaster, provide furring strips, preferably 1 by 3 inches, spaced not more than 16 inches on centers and accurately shimmed to a true level plane. The board may be applied to plywood or other continuous wood backing by nailing. Masonry surfaces, such as concrete, whether plastered or unplastered, should be furred.

Nail the boards to intermediate framing members first, spacing nails 6 inches apart; then along the edges, spacing nails 3 inches apart and ⅜ inch in from the edge. Along edges or on intermediate bearings, for ½-inch board use 1¼-inch galvanized finishing nails, cadmium-plated needle-point No. 17 gauge nails with 3/32-inch flatheads, or No. 16 gauge brads; for 1-inch board, use 1¾-inch nails. Drive finishing nails or brads at an angle and set heads flush with a nail set to avoid hammer marks on the board. Drive flathead nails straight and flush. Do not set any type of nail below the surface.

Where nails are to be covered (with battens, moldings, plastic paint, or wall covering), use 1½-inch galvanized shingle nails, galvanized roofing nails, or box nails for square-edge ½-inch board, driving the heads slightly below the surface; for 1-inch board, use 2-inch nails.

To clean the finished wall, dust may be removed by brushing lightly with a whisk broom or clean rag, or by vacuum-cleaning with a brush attachment. Smudges may be removed with an artgum eraser. If you desire to paint rather than use the finish of the manufacturer, whether you use plank or board, see page 229.

**Gypsum board.** Gypsum board, often called plasterboard, is a low-cost, fireproof material which provides a smooth, strong surface, one you can readily finish

with paint or wallpaper. In addition to the standard material, which has a tough surface paper on both sides of a gypsum core, you can buy gypsum-board panels prefinished, either with handsome wood-grain surfaces or tile patterns.

Gypsum wallboard panels are 4 feet wide and are available in even-foot lengths from 6 to 12 feet. Standard thicknesses are ⅜ and ½ inch.

Adequate backing is essential to provide a good anchor for sheets of gypsum wallboard. Sheets may be applied horizontally or vertically. If you erect your own studding, as in a new partition or in an unfinished attic, use two-by-fours and be sure the studs are vertical. In some cases, as a horizontal joint at chair-back height, you can increase the strength of the wall by toenailing headers on a block of wood between studs and behind joints. To apply over old plaster or masonry surface, use 1-by-3-inch furring as described for wallboard.

Nail the panel to each stud or furring strip it covers. Space nails 6 to 8 inches apart and keep the nails ⅜ inch from the edge of the panel. Use 4*d* cement-coated nails for ¼- or ⅜-inch panels, 5*d* or 6*d* coated nails for ½-inch material. Nail from the center of the panel outward for a snug fit. Use the convex face of the hammer to dimple the nailheads slightly below the surface, so that they can be concealed with joint plaster. But do not drive them so deep you break the paper covering.

The scoring and snapping method of making straight cuts in gypsum wallboard is fast, accurate, and much cleaner than sawing. First, score the paper covering on one side with a sharp knife guided by a straightedge. It is easy to break the gypsum core after you have scored the surface paper. Pull the sheet forward until the scored line is over the edge of the sheet below. Then grasp the edge firmly and snap downward. The plaster core will break cleanly, leaving the waste piece hinged by the covering material on the back. Reach under the sheet and score the underside of the break with the knife, then snap the waste piece upward sharply to complete the separation. Avoid tearing the paper away from the core; it might tear into the section to be used. If it is necessary, smooth the newly cut edge with fine sandpaper and light strokes, keeping the sanding block square with the edge.

Before cutting a piece of gypsum wallboard to fit a space, measure carefully, especially for pieces around windows, heating registers, and electrical outlets. When cutting openings for electrical and heating outlets, first pierce the corners of the opening with a drill. Then cut through both the front and back paper with a knife and punch out the core.

The joints of wallboard may be either hidden or accented as described for other wall materials. The most popular method, however, is to conceal the joints completely. To do this, use a cement made especially for this purpose. Mix it carefully according to directions on the package. With a wide plaster knife, force the first coat of cement into the joint. Apply the cement sparingly. As soon as the joint is buttered with cement, perforated binding tape made for the purpose is pressed into place. Apply tape as tightly against the wall as possible, and scrape away excess cement with a putty knife. The tape reinforces the joint and prevents later cracking.

Three finishing coats of cement make a perfect joint. The first goes on over the tape to fill the recess flush with the face of the board. Each successive coat should extend beyond the edges of the previous coat, with the edges feathered smooth to avoid ridges. Let each coat dry completely, then smooth with fine sandpaper.

Inside corner joints are handled in much the same way. Fold the tape and cement it on both sides of the angle at the same time. Again, apply 3 finishing coats of cement, feathering the edges and sanding lightly. Apply the finishing coats to only 1 side of the angle at a time, however, and let the cement dry between each application. Cement outside corners the same way.

You can apply wallpaper over gypsum board just as over a plaster wall, but use varnish size rather than glue size under the paper. You can also use any type of paint, but a pigmented primer or a varnish size should be applied first.

**Prefinished hardboard.** For beautiful walls in your kitchen, laundry, and bathroom, prefinished hardboards are ideal. They are stiff, moisture-resistant panel boards made of either tempered hardboard or cement asbestos sheets with a surfacing of plastic, lacquer, or enamel. They come in sheets ⅛ inch thick, 4 feet wide, and 4 to 8 feet long. Some types have plain surfaces; others are scored horizontally or in squares to simulate tile.

To prepare the old wall for the board, remove all wallpaper or scaly paint or dirt. Then remove such fixtures as the lavatory, toilet tank, wall-hung accessories, etc. Next mark an accurate starting point for your panel. For a wainscot effect this line is usually 48 inches above the floor. In floor-to-ceiling work, use a level to establish the horizontal joints and a plumb bob to mark the location of the vertical joints.

First cut to size the metal molding used with panel board. Use a hack saw and miter box, and file off rough edges after cutting. The molding has wide flanges through which nails are driven; panels conceal nailheads. Where moldings meet in a corner, flanges must be cut back so they do not overlap. With planning, you can make a decorative feature out of the molding lines.

To apply panel boards, start with an inside corner molding. Leave ¼ inch between the top of the strip and the guide line for the cap strip. Make holes in the flange with a steel punch, then nail the molding in place with 4*d* finishing nails. Caulk the joints between the tab and wall with a waterproof compound, and nail the metal molding in place while the caulking is still soft.

Cut panel boards with a fine-tooth saw held at a low angle, keeping the finished surface face up. Sand rough edges. Try the panel for size, lining it up with a guide line. To get added protection against buckling of the boards with expansion, bevel the edges that fit into moldings. Trim each edge down with a plane or sandpaper until it moves freely into the molding. Bevel on the back side with an ordinary plane held at a 45-degree angle. Then apply the adhesive to the back of the panel, not to the wall. Lay the panel on a padded support and spread the adhesive with a notched spreader. Remove any adhesive that gets on the face of the sheet with a solvent designated by the manufacturer. Long panel boards can be sprung into place after you apply the adhesive. Slip one end of the panel into its molding strip, then bow out the center until the other end will slip into the next molding. Then press the panel into place, kneading and pressing at every point several times until a firm bond with the wall is made. To install a piece of panel board which is too short to spring into place between moldings, insert one side in the attached corner molding (after adhesive is spread on the back), fit the second molding over the exposed edge, and push the panel into place. Only the exposed flange of outside molding is nailed down.

Cap molding for a wainscot may be installed at any time after the panels are in place. Cut the molding, miter the corners, and fasten it with small finishing nails. Countersink nailheads, fill holes with plastic wood, and touch up with paint. Caulk this molding, too. If the paneling runs to the ceiling, use a division molding at this point, then put a crown molding at the ceiling line.

Braces are generally not required for small panels but should be used on larger ones. Make the brace from lumber as shown in Figure 3–8. Never nail a panel to hold it in place as it will spoil the surface of the board.

Standard hardboard and cement asbestos board may be installed as above or can be nailed to furring or studs in the same manner as plywood (page 25).

**Metal and plastic tile.** Metal or plastic tile makes a beautful, durable surface for bathrooms, kitchens, and laundries. Both types are usually available in 4½- or 6-inch squares. In plastic, one type has interlocking edges to help line it up squarely. Another comes with adhesive already applied; you merely soak off a paper backing. You can also buy special molded pieces to simplify fitting around corners, contrasting cap tiles to finish off a wainscoting, and molded base strips. Manufacturers of these materials furnish complete instruction for installation.

Installation of ceramic tile bedded in mortar is a much more difficult job, best left to a tile contractor.

**Glass blocks.** Glass blocks are especially recommended to anyone who is planning to erect partitions, sectional partitions, or decorative panels between rooms where both light and privacy, combined with a certain amount of decoration, are desired. Glass blocks should not be used as a substitute for windows, but as a means of making remodeled basement rooms, attics, or other parts of the home lighter and brighter and of providing extra light at points in the home where ordinary windows are not practical.

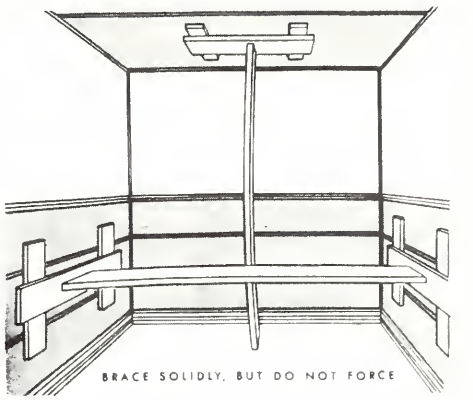



Figure **3–8** Complete bracing for panel boards. *Courtesy of Masonite Corporation.*

Glass blocks are hollow and are available in a number of face designs. The two sizes generally used are the 8-inch and 12-inch blocks. Glass blocks can be laid with mortar by the method used for bricklaying, and this method should always be used where dampness is present. A new prefabricated system for erecting interior sections with strips of wood and wedges is also available. This permits easy erection and complete disassembly with salvage of all parts. Instructions for both types vary, therefore you should check the manufacturer's directions for laying the glass blocks you buy.

## CEILINGS

With a plaster ceiling, like plaster walls, the major problem is cracks. Small cracks may be repaired in the manner described in the section on walls (page 21). But

when large cracks appear or when the ceiling bellies, there is only one practical solution—a new ceiling.

A new ceiling can be made from plaster, fiberboard, plywood, insulation board, or gypsum wallboard. Plastering generally requires professional skill, but the other types of ceiling can be installed by any ambitious homeowner.

After choosing the material, lay out a design to scale on paper. Mark accurately all openings, columns, light fixtures, and other features; then take the unit size of the material you have selected and try to pattern it on the layout. If a border is required, it should be the same size all around; or if a fraction of a course of tile or panel is needed to complete the ceiling, the fraction should be divided equally and part used on each side of the room. Many pleasing arrangements can be developed to suit your individual tastes.

The first thing to do to the damaged ceiling is to install 1-by-2-inch wood furring strips. These are nailed on 16-inch centers (12-inch centers when using 12-by-12-inch ceiling tiles) right over the old plaster at right angles to the joists. Apply any additional furring that may be required to lend added support to the panels. Shim the furring where necessary to provide a true and level surface.

For applying tongue-type tile or in joints that are to be covered with molding, use 1⅜-inch plasterboard nails with 5/16-inch heads or 3*d* smooth box nails. For exposed joints in plaster board, use 4*d* finishing nails, driven at an angle, with the heads carefully set slightly below the surface, or 17-gauge small-headed fiberboard nails driven straight and flush with the surface. Care must be taken to avoid hammer impressions in the finished surface.

When using insulation-board products, it is best to sort them by color, as there may be slight variations. Since this material requires no paint or other finish, care must be taken when unpacking and handling it to avoid scratching or marring the surfaces or breaking the corners and edges.

When installing insulating or acoustical blocks, start them at one edge of the ceiling. The tongue edges should face toward the middle of the room and fit snugly, without forcing, into the next course. Space the nails 6 to 8 inches apart. Face nailing, if necessary on the first and last courses, should be done carefully and neatly. During installation, check the joint lines occasionally for trueness.

On ceilings that are perfectly sound and reasonably level, insulating or acoustical tile may be cemented directly to the existing surface, using a compound that is specially made for the purpose. Remove all grease, dirt, loose paint, and wallpaper that might prevent a proper bond. The adhesive is applied to the backs of the tiles, not to the ceiling. With a putty knife, put 4 or 5 spots of the adhesive, about 2 inches in diameter and ½ inch thick, on each tile. These daubs should be kept 2 inches from the edges and 8 to 10 inches apart. Place the tile lightly against the ceiling about 2 inches from the spot it is to occupy and slide it into place. Pressure must be exerted as it slides to provide sufficient suction to hold it until the adhesive sets.

Installing larger ceiling panels requires either a helper or props. Make 2 T-head props, from one-by-fours, about 1 inch longer than the distance from the floor or scaffold to the ceiling. With the face of the panel down, lift it and wedge it into position with the props. The panels should be forced tightly together except when an open-joint design is desired.

Many different panel-joint treatments are possible with standard wood moldings.

Gypsum boards are installed as described above, and secured with 4*d* finishing nails placed at least ⅜ inch in from the edges and ends and spaced from 4 to 6 inches apart. To make a joint-free ceiling, a mixture of gypsum finishing cement and water is forced into the butts and nail holes. Reinforcing tape is then applied over the joints. After this has dried, another coat of cement is applied, allowed to harden, and then sanded down.

Nail all moldings securely in place, spacing the nails not more than 8 inches apart; use nails that will enter the furring far enough for good holding power.

Although fiberboards, insulating panels, and tile provide decorative surfaces in themselves, it is sometimes desirable to paint them. Any standard lead-and-oil finish—flat, semigloss, high gloss, or enamel—can be applied without sizing or priming of the surface except in the case of plywood, which should receive a coat of special plywood sealer before being painted. If you use plastic paint or wallpaper over insulating or fiber panels, do not expect them to conceal otherwise untreated joints.

Except in its wood-grain finishes, gypsum board must be painted, calcimined, or papered. To get even coverage, first apply a primer or sizing coat.

## FLOORS

The floors in your home receive more wear than any other permanent part of the interior. To keep floors in good condition is not hard if you know what to do, but to restore them after they have been allowed to get in poor condition is a difficult job.

Before refinishing a wood floor, go over the entire area, checking for cracks, loose, squeaky boards, and protruding nailheads. Use a hammer and a nail set to a sink exposed nailheads. Then fill the holes with wood putty or wood filler.

Cracks in a floor are usually the result of shrinkage. Under normal conditions, minor cracks—up to ⅛ inch wide—can be packed with wood putty that matches the color of the floor. Larger cracks may be filled with white dry lead worked into a putty, or by adding fine sawdust to glue melted in a double boiler; both are tinted with stain to agree with the wood finish. But when the boards have shrunk so much that packing filling between them is impractical, the only solution is to cut narrow strips of wood and force and glue them into the gaps.

A squeak in the floor means a loose board in either the subflooring or the finish flooring. Careful examination of the floor where the squeak occurs will generally reveal the fault. If a single board moves when weight is applied and released, you have only the finish floor to work on, but if 2 or 3 together move slightly, then the subflooring is loose.

If the fault is in the subflooring of the first floor, it is usually easy to get at it from the basement. Screw a hardwood cleat to the joist, then pull the subfloor board down to it with long screws that carry through the subfloor and more than halfway into the top flooring. When the finish floor is to blame, drive a few carefully placed ⅞-inch screws through the subfloor and into the loose top boards.

If the loose boards are above a finished ceiling, toenailing from the top will gen-

erally silence the squeak by drawing down the finished floor securely to the subfloor. Finishing nails 1½ inches long should be driven at an angle along the joint, with care being taken not to split the boards. Set the nails with a punch and finish flush with wood putty. Spot on a touch of varnish or shellac after the putty has set.

Where movement is detected at the butt ends of 2 flooring strips, a screw straddling the joint will pull both ends down solidly. Use a ⅞-inch No. 10 flathead screw in a counterbored hole centered on the joint. Counterbore just enough so that the screwhead can be covered with wood putty or a wood plug. Finish the hole to match the floor as closely as possible.

Another common floor trouble, especially in older houses, is sagging. The amount of sag in a floor can be determined by stretching a line taut across the floor at right angles to the joists and tacking it to the surface of the floor on opposite sides of the room. If there is space beneath the floor, such as a basement or excavated area, a sag can be corrected with adjustable steel posts which operate as a screw jack to raise the joists until the surface of the finished floor is in line with the taut string. Jack posts may be obtained from your local lumber or hardware dealer.

If the floor needs refinishing, it must first be sanded. You can probably rent a sanding machine from your local hardware store. Start sanding by moving the machine slowly forward and gently lowering the sanding drum into contact with the floor. Keep the machine moving by walking slowly forward. Take short steps and keep your feet close to the machine. At the end of the forward cut, the standing drum must be raised clear of the floor before the machine moves to a standstill. To start the backward cut, the machine must again be in motion as the drum is lowered into contact with the floor. Sanding must be done with the grain and enough taken off to get down to the clean wood.

If a sanding machine is not available, an old varnish finish may be removed with paint and varnish remover; for shellac-finished floors use denatured alcohol and rub with fine steel wool. Afterward, wash the floor with turpentine or denatured alcohol to remove all traces of the paint remover. When the floor has dried thoroughly, it should be smoothed with coarse sandpaper. If any spots remain, they may be bleached out by using a solution of 1 teaspoonful of oxalic acid in a cupful of hot water. This acid is a poison and should be handled with care.

A paste filler should be applied to fill the pores of the wood. Apply the filler with a coarse cloth, first with the grain and then across the grain. The wood should be rubbed until it is rather shiny, indicating that excess filler is gone. It should then be allowed to dry at least a day. Since the filler raises the grain somewhat, the floor should be sanded lightly with fine sandpaper before the final finishing material is applied.

Varnish presents a glossy appearance that is durable and resistant to stains and spots. Varnish made especially for floors is preferred, since so-called all-purpose varnishes are not durable enough for floors. Two coats usually are adequate. Cleanliness of both the floor and the brush is essential to a smooth finish. Do not try to work varnish too much because it dries rather quickly, and never put it on too thickly. A uniform thin coat hardens best and makes a better base for subsequent coats. Allow the first coat to dry 48 hours before applying the second.

Shellac makes a beautiful finish and requires only an occasional waxing to keep it in first-class condition. The usual

recommended shellac mixture for floors is 1 quart of denatured alcohol to 1 gallon of 5-pound-cut shellac. (The concentration of the shellac in alcohol is known as its *cut*, so *5-pound cut* means that 5 pounds of shellac are dissolved in 1 gallon of alcohol. The cut is indicated on the label.) The first coat on bare wood usually will dry in 15 to 20 minutes, after which the floor should be rubbed lightly with steel wool or sandpaper, then cleaned with a rag dampened in naphtha. A second coat should be applied and allowed to dry 2 to 3 hours.

Floor seal differs from other finishes in that it is not only a surface coating but penetrates the wood fibers and seals them together. In effect, it becomes a part of the wood itself. It wears only as the wood wears, does not chip or scratch, and is practically immune to ordinary stains and spots.

Floor seal may be put on with a brush, a squeegee, or a wool applicator, first across the grain, then with the grain. After a period of 15 minutes to 2 hours, depending upon the instructions of the manufacturer, the excess should be wiped off with a clean cloth or a rubber squeegee. For best results the floor should then be buffed with steel wool. A second coat is recommended for new floors or floors that have just been sanded.

After the finish coat has dried thoroughly, regardless of the floor-finish material used, the floor should be polished with a paste floor wax of good quality.

**Laying floor tile.** Time was when the floor of the average house was just a floor. Today, however, thanks to the attractive tiles and linoleums now available, a floor can be decorative as well as functional. Floor coverings of this kind come in a number of different sizes, with many solid colors and variegated patterns.

Before laying either linoleum or tile on wood, ¼-inch plywood or ⅛-inch hardboard should be installed over it. Under no circumstances should the tile or linoleum be laid over wood floors that are subject to rot, such as those that are laid below grade or those that do not have adequate ventilation from beneath. On concrete basement floors, only asphalt tile is recommended. Above ground, linoleum, rubber, or cork can be used if the concrete is thoroughly dry. Moisture, even in small quantities, will eventually lead to the decomposition of these flooring materials. A simple test to determine whether concrete is dry is to lay pieces of linoleum at several places on the floor and put weights on them so they will have uniform contact with the surface. If, after 48 hours, moisture appears on the bottoms of the test strips, the concrete is not dry enough.

Concrete floors must be smooth and clean. Paint must be removed from surfaces in direct contact with the ground. To accomplish this, dissolve the paint with a caustic-soda or industrial-lye solution (1½ pounds of lye to a gallon of water), and rinse thoroughly with clear water. Dissolve the lye carefully so it will not spatter on you, and wear rubber gloves and goggles. Or you can grind off the paint with a sanding machine, using a coarse paper and sweeping carefully afterward. Expansion joints and score marks should be filled with a material recommended by the manufacturer of the floor covering you are going to use.

When installing linoleum or tile, a minimum temperature of 70 degrees must be maintained before, during, and after application of the material. Before laying the flooring, the floor must be squared. There is no such thing as a perfectly rectangular room. Imperfections in construction, settling, contraction, and expan-

sion all create irregularities that throw room dimensions slightly out of line. And many rooms have alcoves, offsets, and other breaks in the floor area. To overcome these variables, it is necessary to lay out center lines at right angles, using a chalk line and a carpenter's square, as shown in Figure 3–9. After finding the center, arrange the design.

To lay tile, spread tile cement evenly over half the floor, using a notched trowel, and allow the adhesive to dry until tacky; then install the tile, starting at the center or intersection of the chalk line and working to one side, then to the other. Cut the border tile to fit the wall and lay it. Lower the tiles into the adhesive—never slide them into position, as this will force the adhesive up. When laying marbleized or grained tile, place it so the pattern in adjacent tiles runs in the opposite direction.

Asphalt tile can be cut to fit irregularities in walls if heated first with a blowtorch. Always apply the heat to the back of the tile and, to avoid blistering, heat slowly. Then cut the tile by scoring with a sharp nail or pointed tool and splitting on the score mark. Other tile materials may be cut to shape with a sharp knife.

To remove spots of adhesive from the surface of the tile, use a putty knife, then rub with a soapy cloth. If this fails to remove all traces, use steel wool. Never use gasoline or other solvents such as benzine or turpentine.

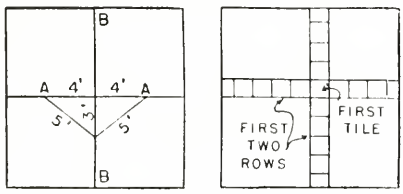



Figure **3–9** Method of laying out asphalt tile pattern. Left: Tiles must be started square to end up square. Chalk lines A and B must be at exact right angles. Right: This is procedure for simple checkerboard layout. If border is used, check for balance as shown. *Courtesy of Kentile Corporation.*

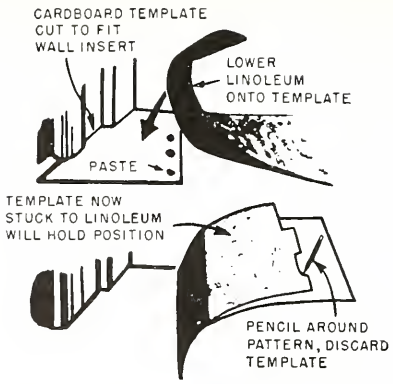



Figure **3–10** Method of determining cutting marks for irregular floor surfaces when using linoleum. *Courtesy of Makers of Armstrong's Linoleum.*

An asphalt base cove can be used instead of a wood molding. First, fit all corner pieces, both at inside and outside corners. Heat the backs with a blowtorch and cut partly through the material; then place the pieces in position against the corners and shape them to fit while still warm. Allow them to cool and, for outside corners, round them off with a light grade of sandpaper. Let the corner pieces stand in position without adhesive while you fit the straight pieces. When all pieces are fitted, cement them in place.

**Laying linoleum.** Modern methods of laying linoleum ensure perfect and lasting joints and seal the edges firmly against moisture. Felt-backed linoleum is laid directly on the prepared floor. If the linoleum is not felt-backed, a felt base should be laid first. The linoleum is cut to fit door moldings and other irregularities. A piece of light cardboard can be used as a template, as shown in Figure 3–10.

After the linoleum has been cut to size, cement is applied evenly to the floor,

a few square feet at a time, and the linoleum is pressed firmly down on it. The entire surface must be well covered with adhesive. To make neat, workmanlike seams, a double cut is used. Lap the edges of the linoleum ¾ inch and snap a chalk line ⅜ inch in from the edge of the top sheet. Cut completely through the top sheet into the bottom one. Remove the top sheet and cut the undersheet along the scored line. The knife blade must be kept at a true 90-degree angle to the floor if the seam is to be successful. As soon as all the linoleum has been cemented in place, go over it with a heavy roller. If no other roller is available, a clean, smooth garden roller can be used. Weights should be placed on the seams to prevent their coming loose before the cement has dried.

Exposed edges of linoleum at doorways or on steps should be protected with standard metal strips. Quarter-round molding should be nailed to the bottom of the baseboards to cover the raw linoleum edges.

To keep the floor clean and attractive, wipe it often with a damp mop and wash it occasionally with soap and lukewarm water. After washing, rinse thoroughly to remove all traces of soap from the surface. Allow the linoleum to dry and apply a coat of water-emulsion wax. The wax will produce a pleasing luster and can be brought to a high gloss with a power polisher. The frequency of waxing depends entirely on the amount of traffic to which the flooring is subjected.

## DOORS

**Modernizing doors.** When old interior doors are badly scarred or so far out of date that they will not harmonize with a modernized room, you can avoid the expense of replacing them by covering them with ¼-inch plywood or ⅛-inch hardboard.

In many cases it is possible to glue the plywood directly to the door, provided the varnish or paint is entirely removed so that the glue will adhere. Plywood or hardboard can also be fastened with finishing nails or flathead screws, nail holes and screwheads being filled when the surfaces are finished later. The simplest way to apply the covering material is to cut it slightly larger than the door, and, after application, carefully saw off the excess and smooth down the edges to be flush with the edges of the door (Figure 3–11).

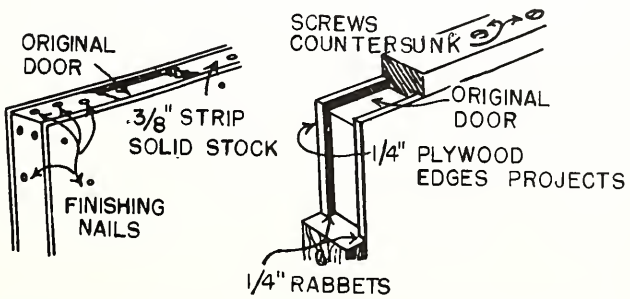



Figure **3–11** Modernizing old doors. *Courtesy of United States Plywood Corporation.*

When the door edges are rounded, so that there is a groove between the door and the covering, or if they are badly marred, it will be necessary to use facing strips. These are applied before the covering material is put on. First remove the door and rip ⅜ inch off its edges, all around. Then rip ⅜-inch stock to a width slightly greater than the thickness of the door and attach it to the edges with glue and finishing nails or screws. Miter the strips at the corners and plane them flush with the door on both sides. Spread glue on the edges of the facing strips and the covering material, and use screws to fasten the covering material down securely, the heads being countersunk below the surface. When the glue is dry, plane the covering edges flush, and round the corners slightly with a fine sandpaper.

In rehanging the door you will have to reset the hinges, lock striker plate, and stops to take care of the added thickness. The new surface may be either stained or plainted. If hardwood plywood is used, the flush door may be finished to match the furniture in the room.

## COUNTER COVERINGS

Many of the projects in this book call for counter coverings of linoleum and laminated plastic. Linoleum is applied in the same manner as to a floor (page 38). The best surface for applying linoleum is ¾-inch plywood, which must be smooth and even. Before cementing the linoleum in place in sink installations, carefully check to see if the linoleum fits the contours of the sink rim; a perfect fit is an absolute necessity to keep water from running between the linoleum and the sink rim. Coat the top of the cabinet liberally with linoleum paste. Then put the linoleum in position, forcing it under the sink rim and all other metal molding. Apply weights to hold the linoleum in place and permit the paste to dry overnight.

Decorative laminated-plastic sheets are widely used as veneers over plywood for table, bar, and sink tops, and for walls and panels. The standard grade of laminated sheet is not affected by boiling water, alcohol, fruit juices, or diluted acids. It will also withstand heat up to 250 degrees Fahrenheit. Available in a wide range of colors, patterns, and wood finishes, the sheets come in widths of 2, 2½, 3, and 4 feet, and lengths of 5, 6, 7, and 8 feet. Thicknesses are 1/16, 5/32, and 5/16 inch.

It is possible to obtain a clean-cut edge by marking with an awl or ice pick and cutting with laminate side up. Hand cutting can be done with a straight-toothed, 24-to-the-inch hack saw, the sheet being fed slowly to avoid chipping. An ordinary wood plane may be used for trimming.

Face veneer used beneath a laminated sheet must be of an even texture, such as Philippine mahogany, cedar, pine, or any solid (grade 2) hardwood plywood. Douglas fir is subject to grain registration which may show through the plastic sheet, but on certain types of work this may not be objectionable. To bond the sheet to the plywood by cold gluing, use an adhesive of the resorcinol-resin, casein, or urea-formaldehyde type. The glue should be correctly mixed in strict accordance with the manufacturer's instructions. Remember that urea-formaldehyde and resorcinol glues must be used at room

temperatures of 70 degrees Fahrenheit or higher. The backs of all plastic sheets are sanded at the factory and are free of all foreign matter; but should oil, grease, or wax get on the backs later, be sure to sand off thoroughly or wipe with mineral spirits or naphtha.

The bond is made by applying glue to both the plywood and the back of the plastic sheet and allowing it to remain a few minutes before assembling. Then place plastic and plywood together and apply adequate pressure—not less than 50 pounds per square inch for urea-formaldehyde and phenol-resin glues; casein glues can be used with pressure of 25 pounds per square inch (For homecrafters not having pressing facilities, the use of phenol-resorcinol or casein glues is strongly recommended. After the glue has been spread and the plastic sheet and plywood are brought together, lay flat boards or panels over the surface, putting as much weight as possible—books, concrete blocks, brick, etc.—upon these boards; use clamps to hold the edges of the boards.) Scrape and wipe squeezed-out glue from all edges before it sets. Retain pressure for at least 4 hours and do not attempt to fabricate for at least 24 hours. A backing sheet on the underside of the plywood is recommended, to guard against warping; it is applied in the same manner as the decorative top sheet.

When the bonding is complete, trim the edges square with the edge of wood with a single-cut file, working carefully and slowly to avoid chipping. If the laminate is to be covered with a metal or wooden edging, carefulness is not too important. If the edge of the laminate is not covered, the laminate should be filed at a slight bevel, just enough to break the sharp corner. This is done with the flat side of the file.

If the edge of the work is covered with a piece of laminate, the edge is done first and then the top surface. To edge-band with plastic, first fill the plywood end grain with plastic wood or a mixture of sawdust and glue. When dry, sand lightly and spread the edge with adhesive. Cut the laminate so that it will be flush with the bottom edge and wide enough to extend about ¼ inch above the top surface of the plywood. Then apply the oversize plastic strip with block and clamp and plane or file off the waste flush with the top surface after the adhesive has set. If it is necessary to bend the surface strip around a corner, heat it at the bend with a heat lamp (never an open flame) to prevent surface cracking. However, do not attempt to bend it around a sharp corner. The laminate covering the top surface should always be laid to extend over the edge of the facing strip.

To edge-band with a metal T molding, trim the faces flush and kerf for the molding. Then force the molding into place with a rubber hammer. Nail the ends of the molding from the underside with small brads.

In many lumberyards the decorative laminates may be purchased already applied to ¾-inch plywood. Also there are available, although more expensive than the type previously described, laminates that can be bonded to a plywood or wood surface without the use of clamps by using special adhesives. These materials, available in either roll (1/32 inch thick) or sheet (1/16 inch thick) form, have the adhesive already applied on the back which, when activated by special solutions, draws the laminate tight to the wood surface. Detailed installing instructions are furnished by the manufacturers of this material.

# CHAPTER 4

## LIVING-AREA IMPROVEMENTS

THE MOST important room in the house is the living room, for it is the one room used by all the members of the family and by all the guests. Living-room uses are extensive and varied. First, it is the show place of the entire house—a room that should always be in good taste, always kept clean and uncluttered in case guests drop in unexpectedly, a room in which the family's personality and living patterns are on display. It is the place for entertaining—card playing, talking, dancing, formal and informal parties of all kinds. It may be used, too, for dining and for accommodating overnight guests.

There are many ways to improve your living room, to make it more convenient, attractive, and easy to keep clean. But before you start any carpentry work on remodeling, study the room carefully; make a check list of the family uses of this room and then draw a plan of the room showing the rearrangement of furniture and placement of built-ins and other pieces you have in mind. The photographs and drawings in this chapter will help you visualize your improvements before you start work on them.

Basic repairs and improvements for floors, walls, and ceilings are discussed fully in Chapter 3.

## SECTIONAL STORAGE WALLS

Wall storage units eliminate the need for such articles of furniture as bookcases, desk, radio, music cabinet, china and linen cabinets, etc., thus saving space and housework. Since living-room furniture usually represents the largest portion of your furniture investment, the elimination of some of these items will help defray the cost of building wall storage units and at the same time will make your living quarters roomier and more convenient.

Storage units, which may be stacked against a wall or used as a partition to divide 1 room into 2, are all variations of a simple box. Each is constructed separately, fitted with the necessary shelves, hinged doors, sliding panels, etc., and then placed next to and on top of others. You will find uses for such units, not only in the living room, but in almost every room in the house.

**A typical storage wall.** The dimensions of the storage units shown in Figure 4–1 are 36 inches wide by 11½ inches deep. Other standard widths are 24, 30, and 42 inches; depths, 18 and 23 inches. If the height of each unit is either 6, 12, 18, 24, 36, 48, or 60 inches, it will be easy to fit them together in a number of combina-

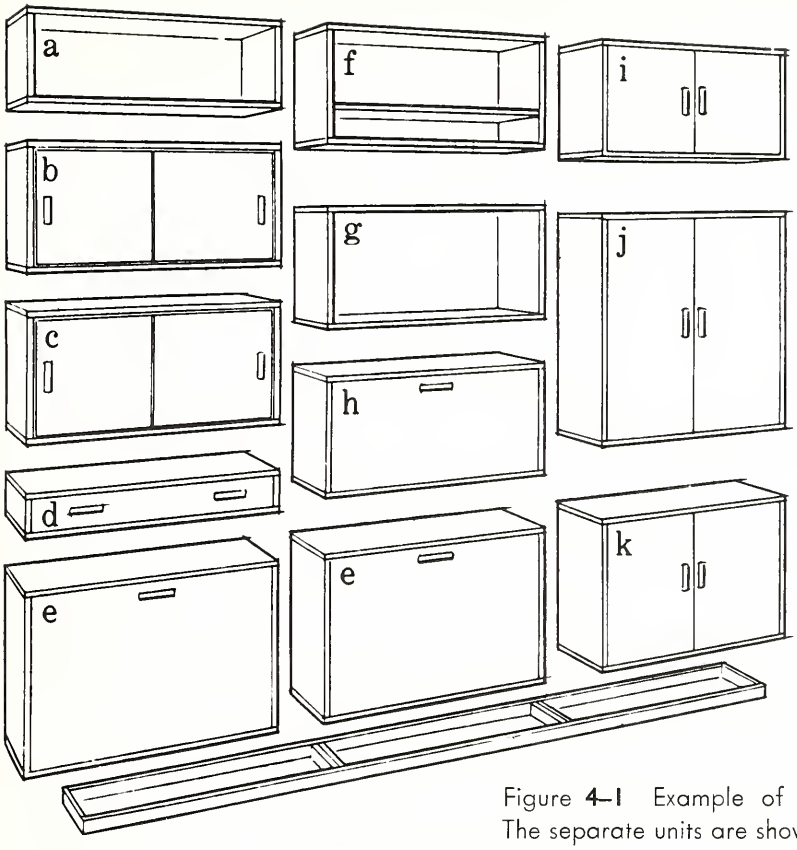



Figure **4–1** Example of a storage wall. The separate units are shown in Figures 4–2 through 4–9.
*Reprinted from* Woman's Day.



Figure **4–1A** Photograph of a storage unit. *Reprinted by permission of* Woman's Day, the A & P Magazine. *Copyright 1950. Ben Calvo, photographer.*

tions. All these dimensions may be varied, of course, to suit your own needs.

Assemble the frames of the units with ¾-by-11½-inch pine shelving, according to the directions on joints (Chapter 2). For strong construction, and easy construction, the butt type of joint is shown in the illustration of the units; however, many other joints can be used if woodworking equipment is available. When using this type of joint, butt the sides against the top and bottom pieces since this gives a better appearance.

Glue all the surfaces to be joined before screwing or nailing them together. To keep the frames square, glue and nail ¼-inch plywood backs in place while the glue on the frames is drying.

Make the hinged doors of cabinets and the desk front of ¾-inch plywood; the bin front of ⅛-inch hardboard sanded or planed on the edges for an easy fit. Recess hinges. Make sliding doors of ⅛-inch hardboard rounded slightly at corners for easy sliding.

Make handles 3¾ inches long from 1-inch round. Saw the ends at a 45-degree angle in toward the back. Plane a ¼-inch flat area along the back to fit against the unit. Attach the handles from inside the unit with 2 screws. Other handle details are shown throughout the book and may be substituted for these if desired. Also, a wide variety of handles, in metal, plastic, etc., is available from your local hardware dealer.

When finishing storage units, set all nailheads and countersink all screws (see Chapter 2). Apply wood filler where needed. When dry, sandpaper thoroughly and finish as desired, according to instructions in Chapter 12.

Instructions for the individual units shown in Figure 4–1 follow.

*Open bookshelf* (unit *a*). MATERIALS: ¾-inch shelving; ¼-inch plywood, glue; nails.

Cut and assemble all parts of the open bookshelf as shown in Figure 4–2.

*Sliding-door cabinets* (units *b* and *c*). MATERIALS: ¾-inch shelving; ¼-inch plywood; ⅛-inch hardboard; ¼-by-⅞-inch lattice; 1-inch round; glue; nails; wire brads.

The 2 cabinets are made exactly the same (see Figure 4–3) except that cabinet *c* has an extra shelf. To make tracks for doors, rip lattice strip to ¼ by ⅜ inch for sides and bottom; ¼ by ½ inch for top. With wire brads, attach outside

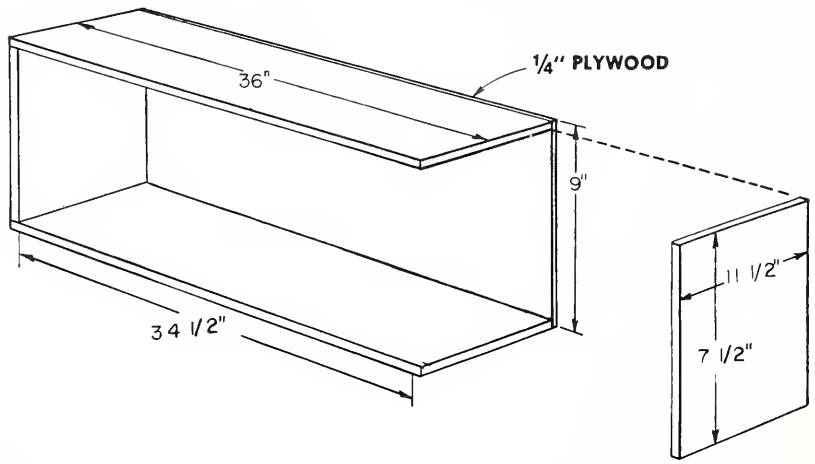



Figure **4–2** Open bookshelf (unit *a*). *Reprinted from* Woman's Day.

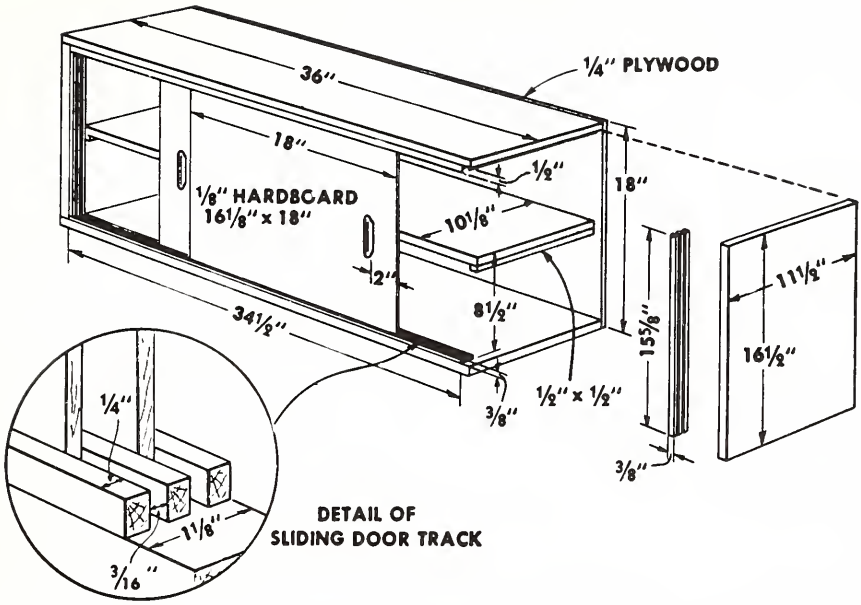



Figure 4–3 Sliding-door cabinet (units *b* and *c*). *Reprinted from* Woman's Day.

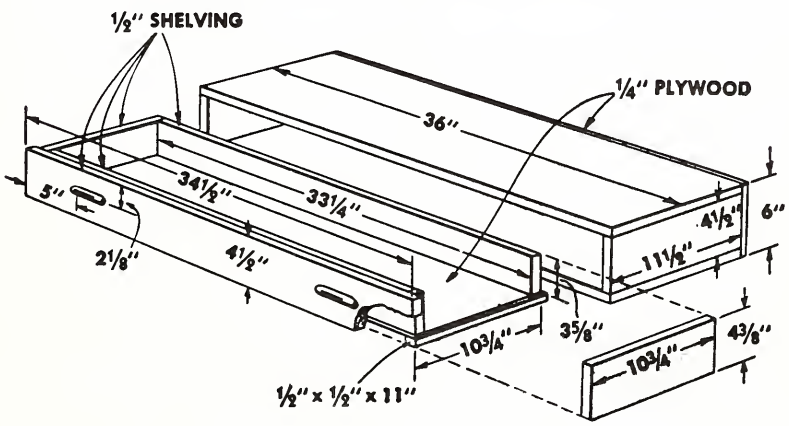



Figure 4–4 Drawer (unit *d*). *Reprinted from* Woman's Day.

strips flush with front edge of box; plane a ¼-inch strip to 3/16 inch and use it as a guide for space between strips. At corners, side strips should butt against top and bottom strips. To fit doors into place, lift top edges into top tracks first, then drop doors into lower tracks.

*Drawer* (unit *d*). MATERIALS: ½- and ¾-inch shelving; ¼-inch plywood; 1-inch round; glue; nails; screws.

See Figure 4–4. Nail sides to front and back, then screw ½-by-½-inch strips flush with bottom edges of sides. The ¼-inch projection at the back acts as drawer stop. These strips leave ¼ inch of space in which to slide drawer bottom into place under lower edge of front, over tops of side strips, and under lower edge of back.

Attach handles to false front, then glue

and screw false front to drawer. False front extends ⅛ inch past sides of drawer and is ⅛ inch higher than its top edge. Sand or plane edges of false front for an easy fit into the box.

*Bin* (unit *e*). MATERIALS: ¾-inch shelving; ¼-inch plywood; ⅛-inch hardboard; 1-inch round; ½-yard good-quality 3-inch upholstery webbing; two 3-inch mending plates; pair 2-inch butt hinges; glue; nails; screws.

See Figure 4–5. Cut notches in bottom and sides of bin section for braces. Butt bottom of bin against sides. To keep bin squared, attach top back brace and back while glue is drying. Join front braces with middle-lap joint and attach to bin. Attach front, which extends ⅛ inch beyond sides and top brace.

Fold-over end of webbing 1 inch; center in box against back of top; lay mending plate on it and screw in place. To adjust webbing as a stop when bin is opened, pull bin out until it begins to fall forward; draw webbing into place, centering in front of back brace. Allowing 1 inch for turn-under, cut off extra webbing, then screw mending plate over it. Attach hinge, centering it 1¼ inches from top edge.

*Double shelf* (unit *f*). MATERIALS: ¾-inch shelving; ¼-inch plywood; glue; nails.

This unit is constructed like the open bookshelf (Figure 4–2) except that height is 18 inches and an extra shelf is added. Allow 4½-inch space between shelf and bottom board.

*Open record-album shelf* (unit *g*). MATERIALS: ¾-inch shelving; ¼-inch plywood; glue; nails.

Follow instructions in Figure 4–2, but but make the height 18 inches.

*Desk* (unit *h*). MATERIALS: ½- and ¾-inch shelving; ¼- and ¾-inch plywood; 1-inch round; pair 2-inch butt hinges; pair folding lid supports, left and right; bullet catch; glue; nails; screws.

See Figure 4–6. Make box, then make pigeonhole assembly from ½-inch shelving and nail it into box, first measuring from outside of box to the point where

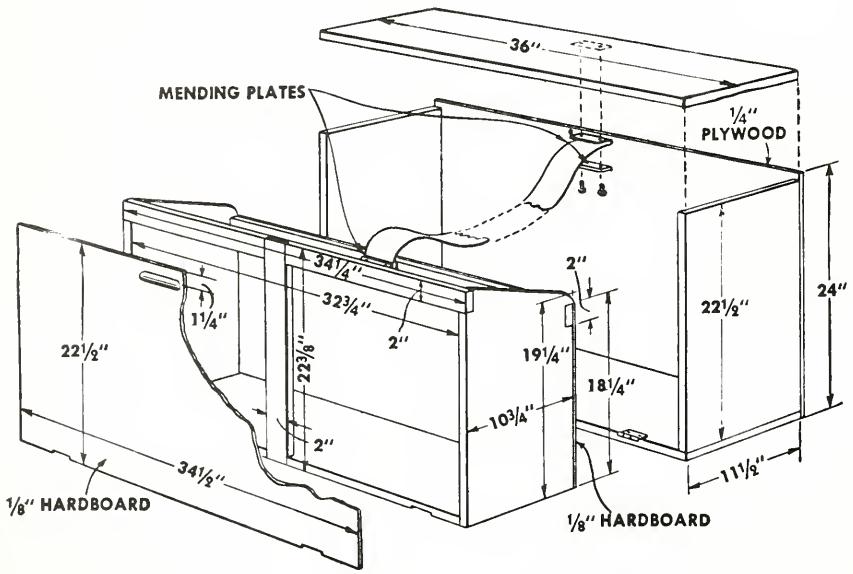



Figure **4–5** Bin (unit *e*). *Reprinted from* Woman's Day.

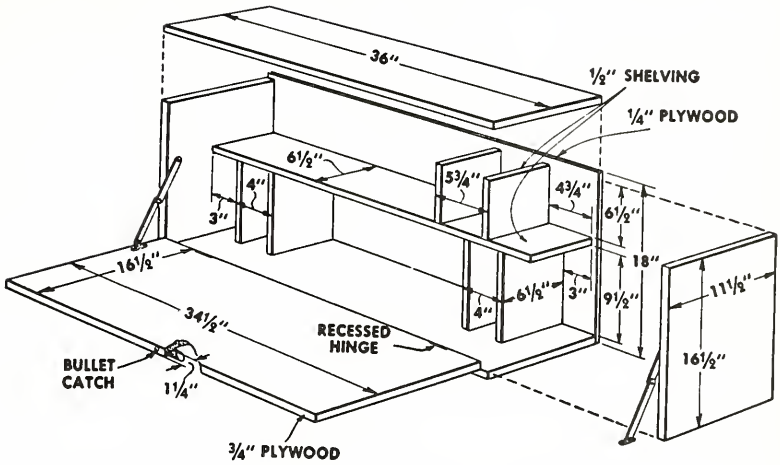



Figure **4–6** Desk (unit *h*). *Reprinted from* Woman's Day.

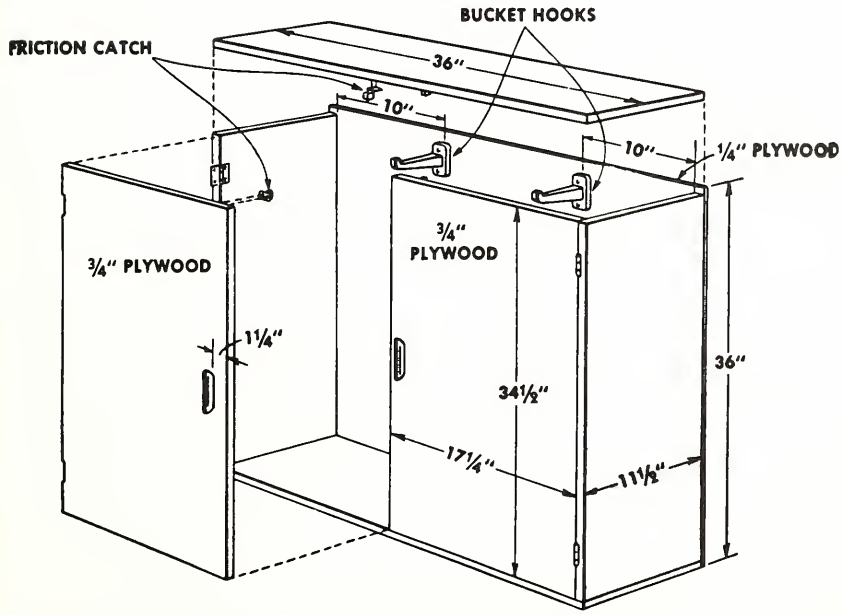



Figure **4–7** Clothing cabinet (unit *j*). *Reprinted from* Woman's Day.

nails should be driven. Attach front with recessed hinges and folding lid supports. Install bullet catch.

*Two-door section* (units *i, j,* and *k*). MATERIALS: ¾-inch shelving; ¼- and ¾-inch plywood; 1-inch round; 2 pairs 2-inch butt hinges; 2 friction catches; glue; nails; screws. For *j* only: 2 bucket hooks; ¾-inch bolts; nuts; washers. For *k* only: ½-by-½-inch lumber.

To make the 1-shelf cabinet (unit *i*), make frame of box to dimensions in Figure 4–3, adding doors as in Figure 4–7.

To make the clothing cabinet (unit *j*), see Figure 4–7; attach bucket hooks to back with bolts, nuts, and washers.

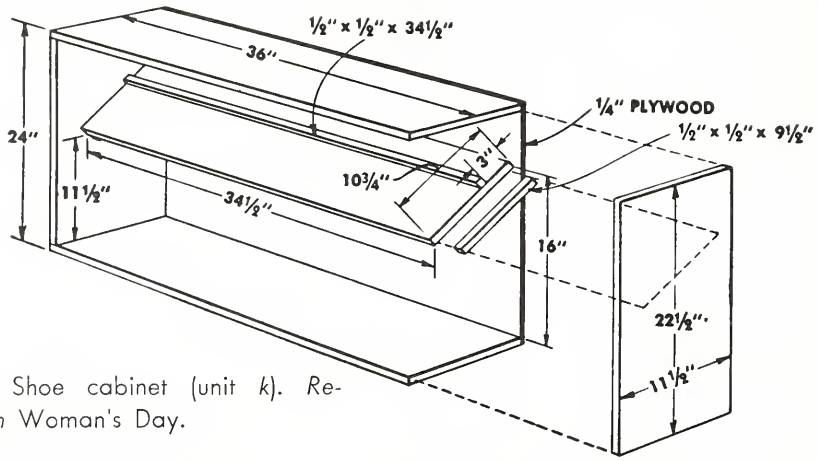



Figure 4–8 Shoe cabinet (unit *k*). *Reprinted from* Woman's Day.

The shoe cabinet (unit *k*) is shown in Figure 4–8. Add doors as in Figure 4–7. If the cabinet is to store men's shoes, tilt shoe shelf farther down to allow more space for longer shoes. If the shoe shelf is placed horizontally, this unit becomes a 2-shelf cabinet.

*Base for assembled units.* MATERIALS: ¾-inch shelving; 4 2-inch angle irons per section; glue; nails; screws.

See Figure 4–9. Butt sides against front; butt back against sides. Every 36 inches attach 2 cross boards inside base, allowing $\frac{1}{16}$-inch clearance between them. (If wall is dismantled and units are used separately, base can be sawed apart between these boards and reused under separate units.) Set base back 1 inch from front edge of units and attach with angle irons. If necessary, attach base to floor with angle irons.

**Joining units together.** Join units to each other to form a wall by using 1½-inch mending plates on the backs as in Figure 4–10. Where units join, screw mending plates A at top and on right edge of each unit, flush along edges, with ½-inch washers (as thick as a mending plate) between mending plates and unit. At bottom and on left edge of each unit screw only 1 end of mending plates B, so that they are perpendicular to, and extend ⅔ over, edges. This makes it possible for mending plates B extending over the left edge of a unit to fit under mending

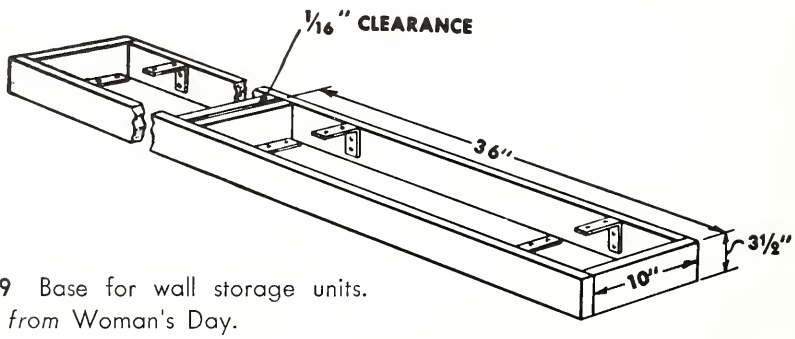
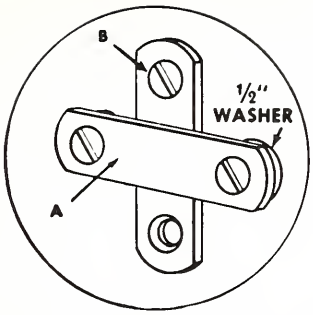



Figure 4–9 Base for wall storage units. *Reprinted from* Woman's Day.



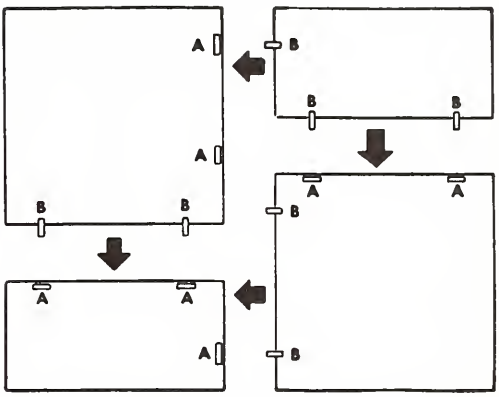




Figure **4–10** Attachment of mending plates to assemble sectional wall units. *Reprinted from* Woman's Day.

plates A along the right edge of the adjoining unit; and plates B at bottom edge of an upper unit to drop down under plates A at top edge of the unit below. Attach as many as needed.

If there is any variation in depth of units, use additional washers between mending plates and back. To increase stability, as in desk unit, after unit is in place fasten loose end of projecting plates B with a ⅜-inch screw.

When using storage units with one end against a wall, attach them to wall with angle irons. When making an L-wall or a T-wall from units (Figure 4–11), secure the sections with angle irons at the corners and with 2 mending plates across joining point at top.

**Adaptability of sectional units.** Sectional wall units can be used individually or in varying combinations to modernize almost any room in your home (Figure 4–12). The units in Figures 4–3 to 4–8 (units *a* to *k*) may be adapted to many uses by changing the height, length, or width. When making changes, however, it is advisable to keep the shelf spacing as shown, so that the various units will fit together if it is ever desirable to rearrange them.

One obvious and very great advantage of these units is their portability. They can be taken along when moving, and adapted to a new home—something which cannot be done with permanent storage construction. The design of these units, however, produces a built-in effect, no matter what combination of pieces is selected.

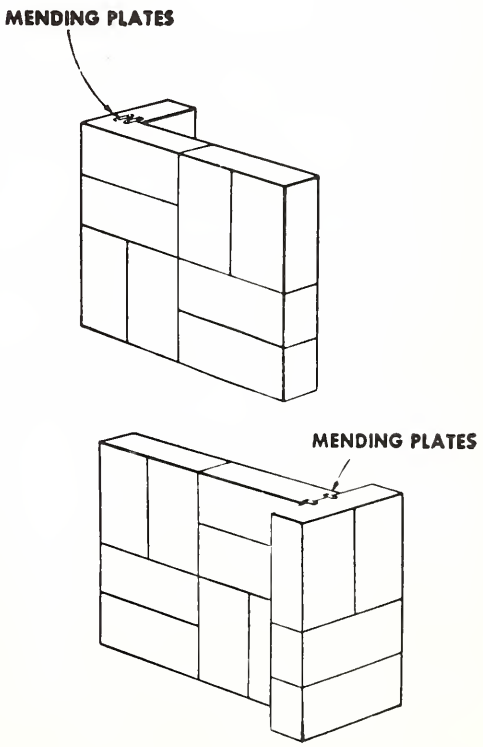



Figure **4–11** Arrangement of sectional units into an L- or T-wall. *Reprinted from* Woman's Day.

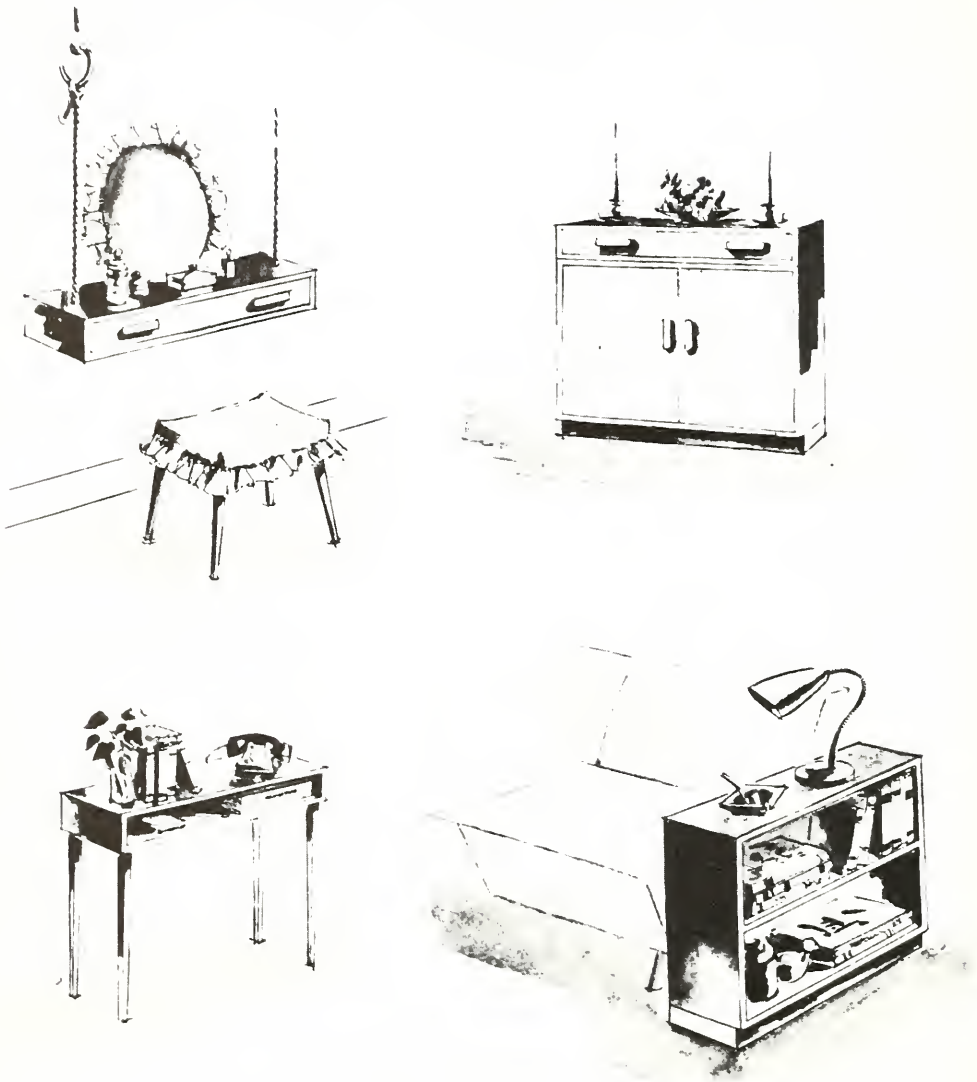


Figure **4–12** Making unit furniture from wall units. *Reprinted from* Woman's Day.

**Other sectional-unit designs.** Other storage unit designs may be found in Chapters 6 and 9. Figure 4–13 shows 3 types of bases that may be used for mounting the units.

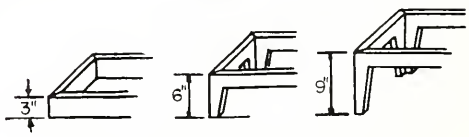


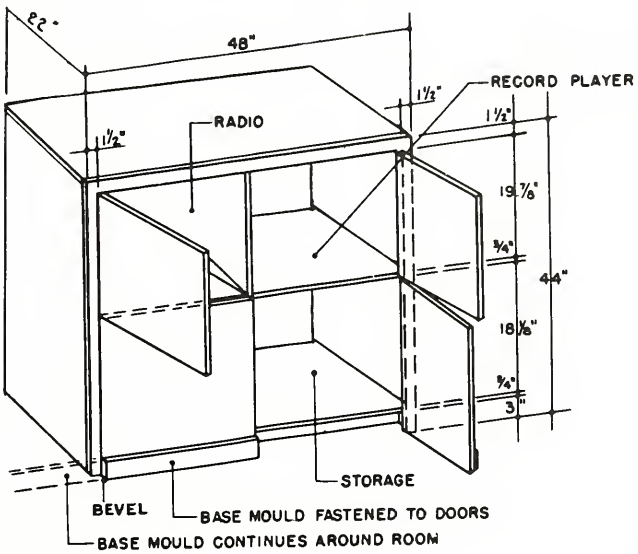

Figure **4–13** Unit-furniture bases.

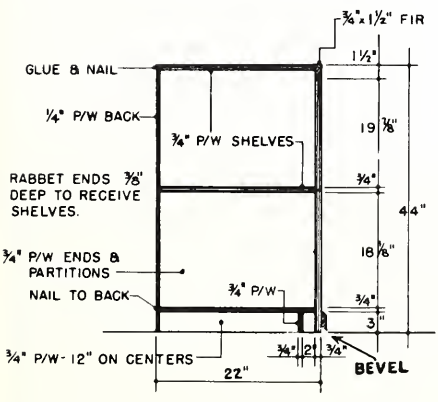
Plan your units carefully to get the most storage from the fewest cabinets, and to meet the needs of your family. The following units may be added or substituted in the sectional storage walls shown.

*Three-shelf cabinet.* Make frame of box to dimensions in Figure 4–7, adding

3 shelves spaced 12 inches apart, using shelf construction shown in Figure 4–18.

*Combination radio and record player.* By building your own radio-phonograph cabinet you can fit it into the built-in scheme. The dimensions shown in Figure 4–14 will fit most existing radio units; however, they may be changed to suit your set, if necessary. The speaker unit, which should be separate for best results, can be made from the box-frame dimensions of Figure 4–7, except that the front is made of ¾-inch plywood cut out according to the speaker size. The front speaker opening may be covered with grille wire or cloth. Check with your local radio dealer for instructions on the installation of radio and speaker.



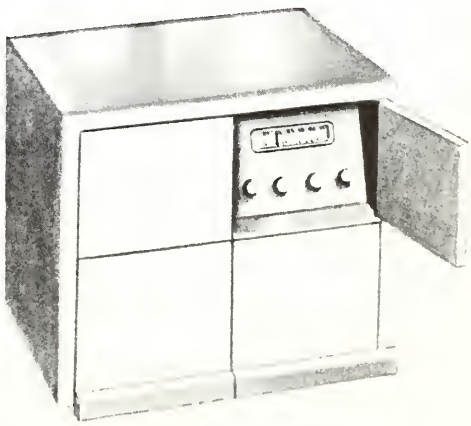



Figure **4–14** Combination radio and record-player cabinet. *Courtesy of Malarkey Plywood.*

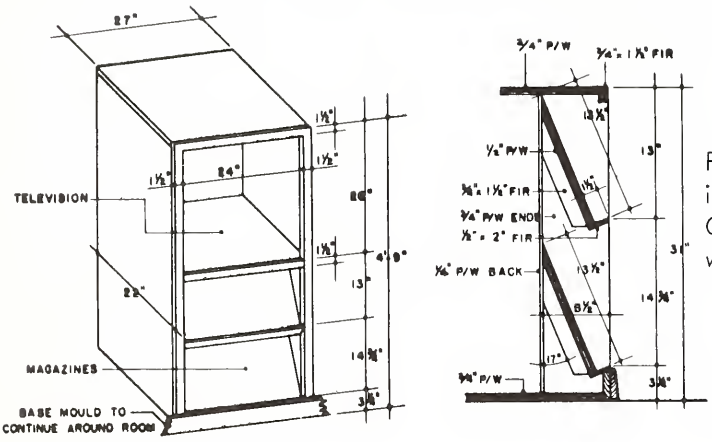



Figure **4–15** Television cabinet and magazine shelves. *Courtesy of Malarkey Plywood.*

*Television cabinet and magazine shelves.* This unit (Figure 4–15) fits in the storage-wall setup, the top section being designed for the standard television set. The front panel should be made according to manufacturer's instructions. The speaker is placed in a speaker cabinet as described above. The lower section, with sloping shelves, is used for magazine storage.

*Magazine stand.* Figure 4–16 is another magazine stand that is suitable for a sectional furniture setup. This stand, planned to hold current and back issues of magazines conveniently and attractively, can be built easily at home. Since it was intended for a particular space, it was made 5 feet long, 1 foot deep, and 2½ feet high. These proportions are pleasing but they may be altered to fit other spaces.

The unusual feature of the stand is the slanting top shelf. This shelf is edged with a strip which serves both as a decorative finish and a support for the row of current magazines which lend their bright color to the room.

The lower shelf is used for back issues of magazines and for books. The apron front between the lower shelf and the floor conceals two sturdy crosswise supports which prevent the lower shelf from sagging beneath the weight of the magazines.

A stainproof top, perfect for flower containers, is a piece of double-thickness window glass, bought and cut to size at the local store. This glass need not have the thickness or beveled edge of plate

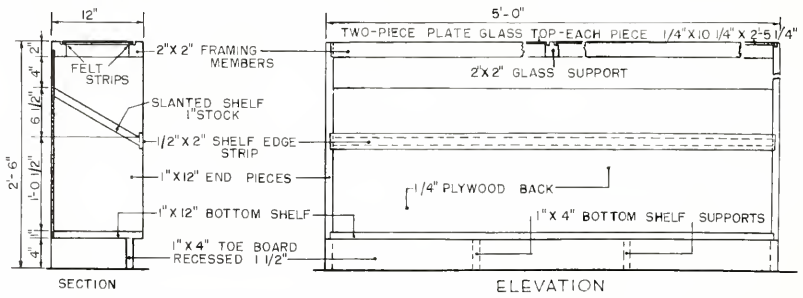
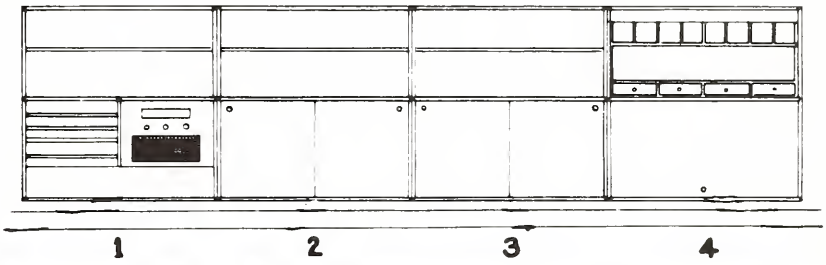



Figure **4–16** Built-in magazine stand. *Reprinted from* Popular Home—*United States Gypsum Company.*

glass. The glass top is put in place after the stand has been given 2 coats of paint to match the woodwork of the room.

Another complete sectional storage wall unit is shown in Figure 4–17. In this case a more horizontal effect is produced by lowering the height and increasing the length of the assembled units.





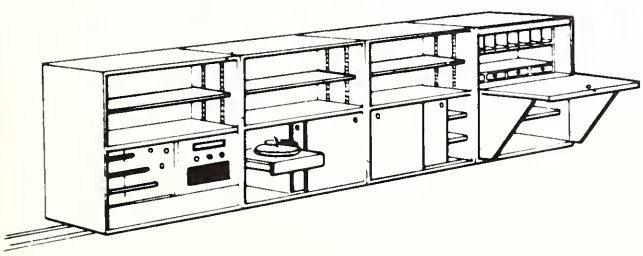
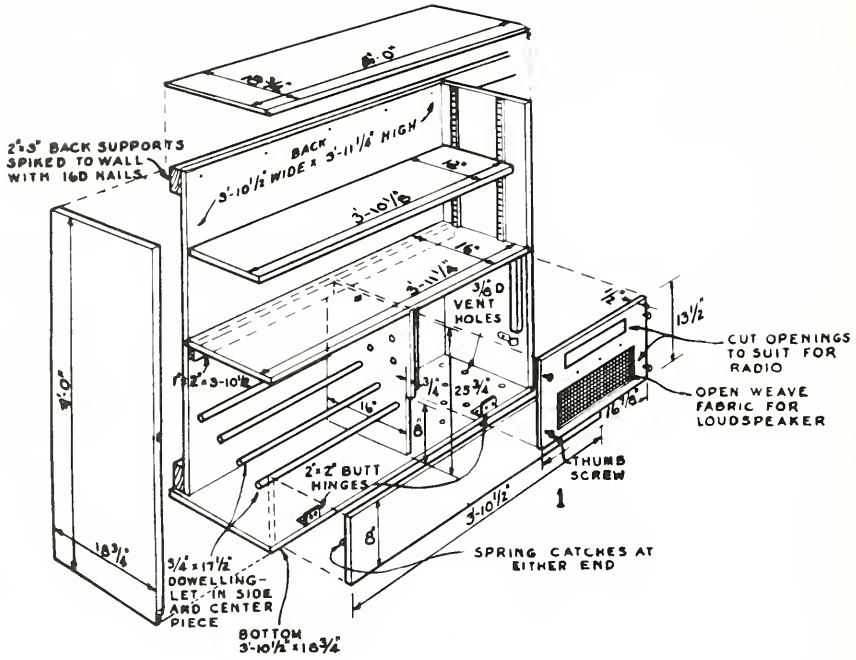
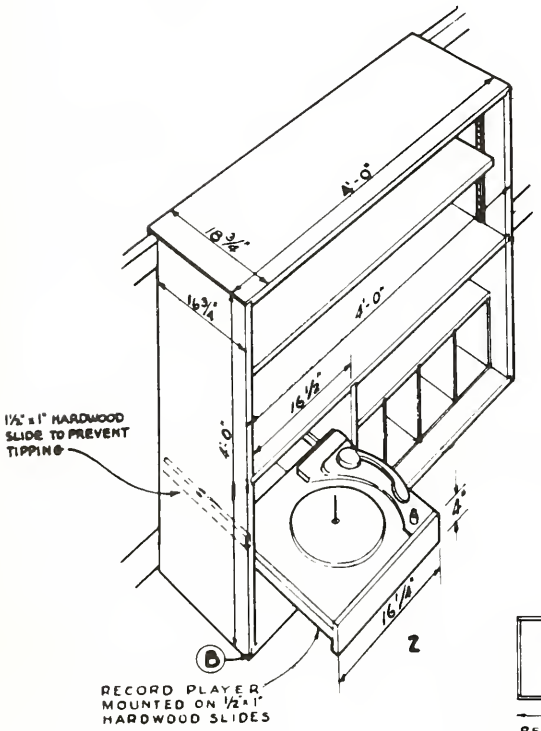
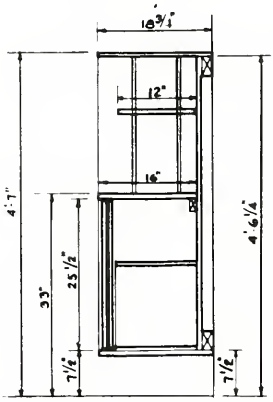



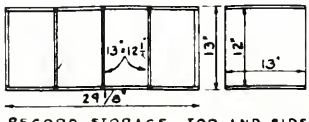
Figure 4–17 Example of a low storage wall which has a built-in desk and also holds books, radio, record player, and record library. *Courtesy of Douglas Fir Plywood Association.*



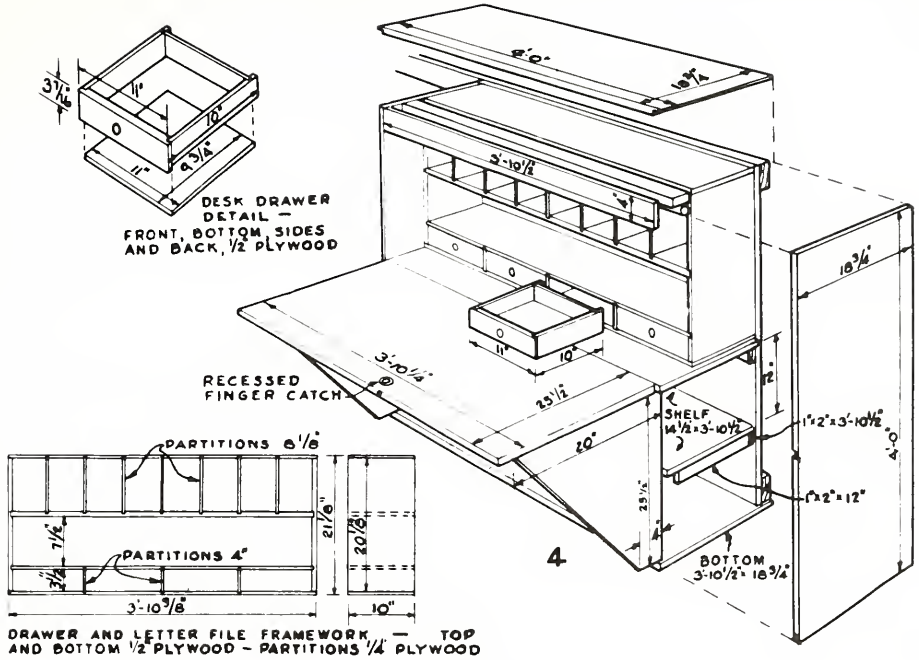



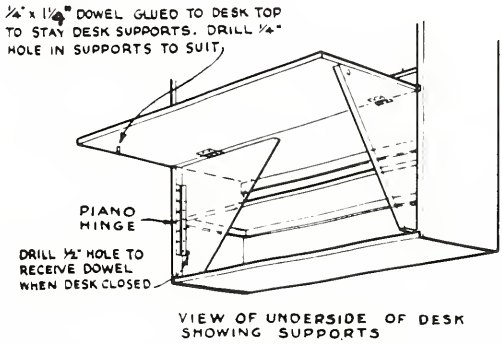




SECTION THROUGH #2




RECORD STORAGE - TOP AND SIDES ½ PLYWOOD - PARTITIONS ¼ PLYWOOD




NOTE - ALL PLYWOOD ¾ THICK EXCEPT WHERE OTHERWISE NOTED

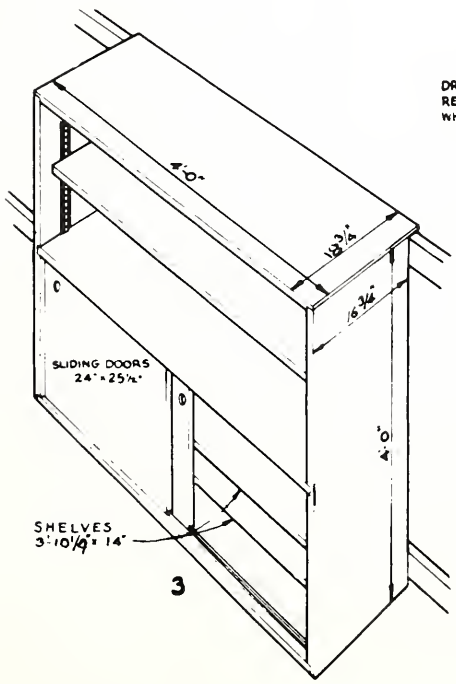



Figure **4–17** (*continued*) Plans for wall unit shown on page 53. *Courtesy of Douglas Fir Plywood Association.*

# SHELVES AND CABINETS

**Shelf construction.** The usual construction of home bookcases merely requires the fitting of boards together at right angles in good and practical proportions. When designing your bookshelves, make them as near as possible to the actual width of the books, because this reduces the amount of exposed shelving to be dusted. For this reason, shelving is generally 1 by 8 or 1 by 10 inches.

Shelves spaced 9 inches apart will accommodate most books, and a shelf or two with 11- or 12-inch clearance will take care of the larger ones. One-inch boards can support spans of about 3 feet without sagging. Two-inch boards can span approximately 5 feet. Longer spans require additional support such as toenailing them into the backing of the bookcase or into the wall studs. Other popular methods of support are shown in Figure 4–18.

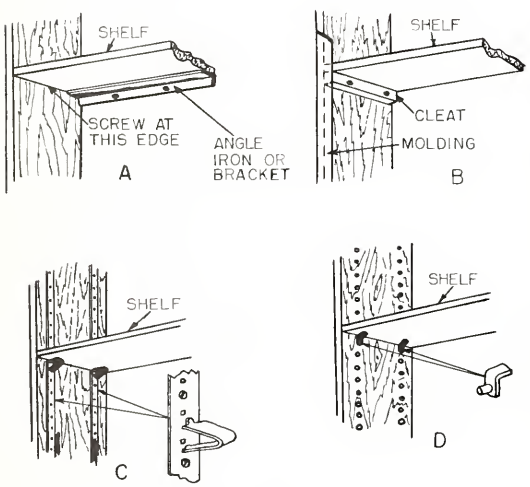



Figure **4–18** Method of constructing bookshelves.

Angle irons or metal shelf brackets (Figure 4–18, detail *A*) can be used successfully, especially where the back wall is painted a dark color. The front edge of the shelf is screwed to the side of the bookcase. If desired, a dado joint (page 13) may be used in place of screws. Cleats (detail *B*), quarter-round molding or small metal angle-L brackets can also be used and may be masked from direct view by vertical molding strips along the side edges of the shelves. Perforated metal strips and angle fins which attach to the strips (detail *C*) give very good support and are adjustable so that the heights of the shelves may be changed. They are available from most hardware stores. Detail *D* shows another adjustable-type shelf rest which sets in ¼-inch holes and may be spaced as desired. Other shelf support methods are shown in other projects in this book.

**Record cabinets.** The record library shown in Figure 4–19 provides plenty of space for a growing record collection. Located near the phonograph, it keeps every album in its place so that you know where to look when you need it. Hidden, pull-out stairs make it easy to reach the upper shelves. This unit can be used in a "dead" corner.

A slotted record-album cabinet (Figure 4–20) can be conveniently placed in that portion of the living-room wall devoted to entertainment. Make it to the measure of your record albums.

**Corner cabinets.** The corner cabinet shown in Figure 4–21 is made of ¾-inch plywood with shelves of 1-by-12-inch

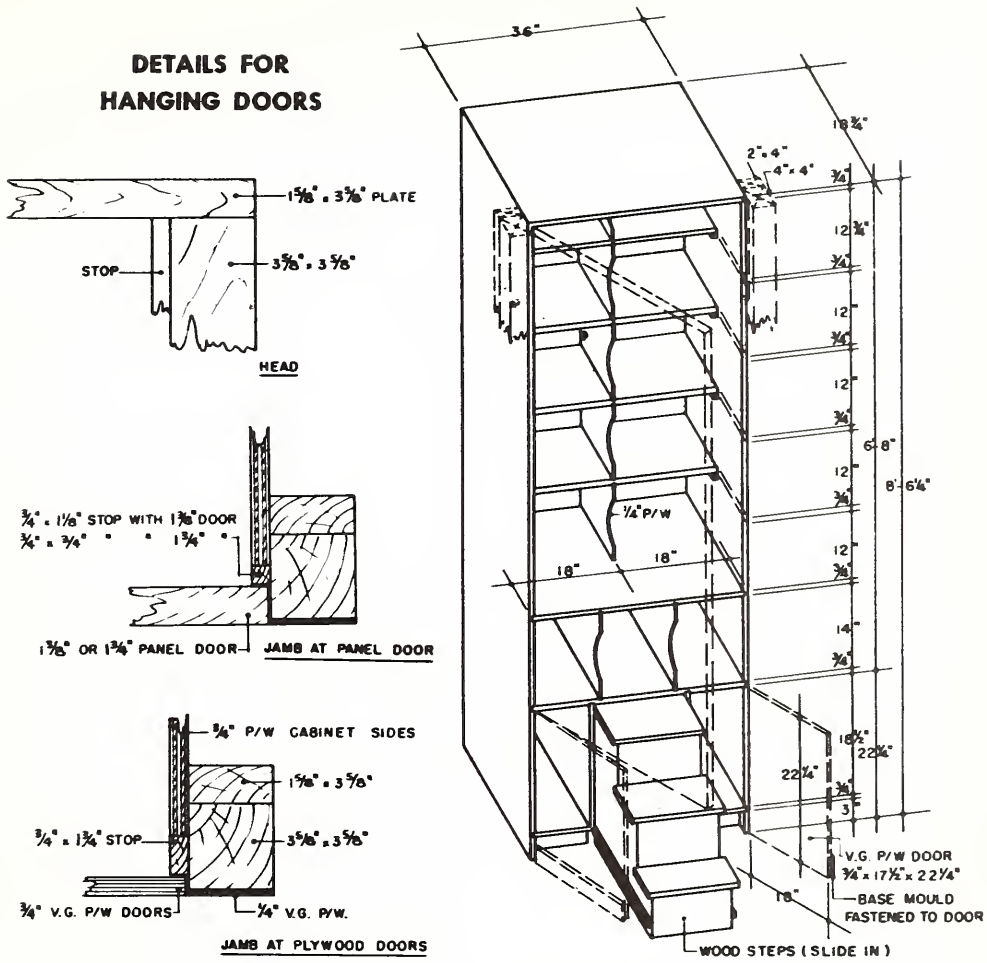



Figure **4–19** Record library. *Courtesy of Malarkey Plywood.*

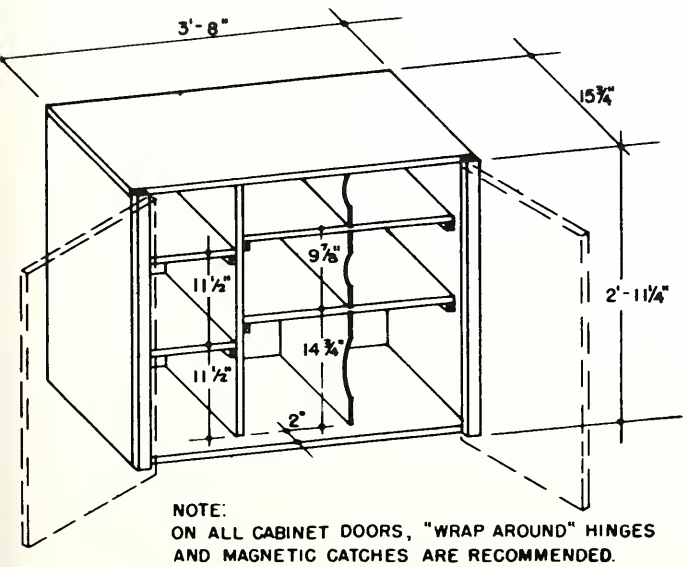



Figure **4–20** Slotted record-album cabinet. *Courtesy of Malarkey Plywood.*

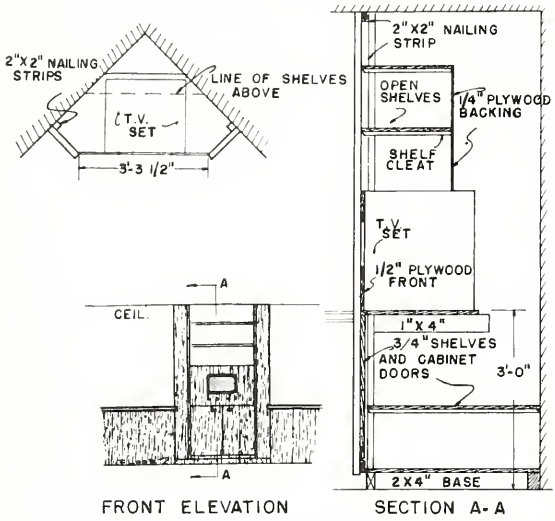
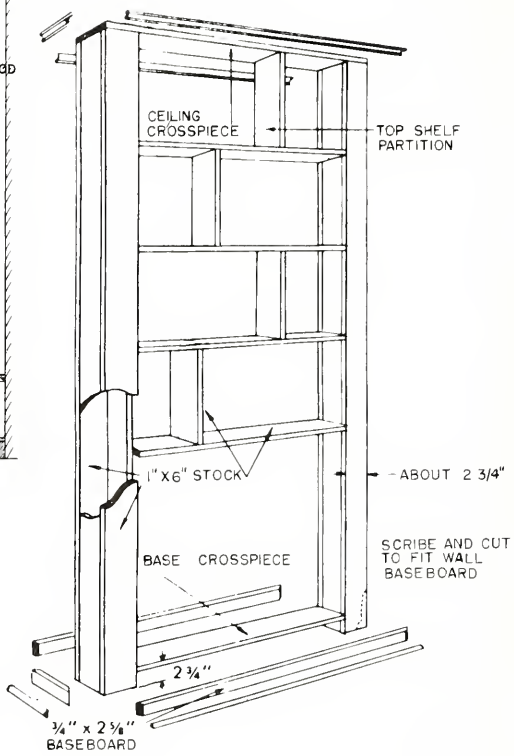



Figure **4–21** Corner cabinet housing a television set. *Reprinted from* Practical Builder*—United States Plywood Corporation.*

lumber. The cabinet front is cut from 1 piece of 4-by-8-foot, ¾-inch plywood. The unit may be painted or left natural as desired. A television set may be easily installed in a corner cabinet, but consult your local radio-television dealer for details.

**Wall dividers.** Various attractive arrangements of shelves may be made to serve as partitions, or partial dividers, in a room. To make the wall divider shown in Figure 4–22 use 1-by-6-inch stock lumber, making the height and width of the open-shelf portion to suit your requirements. First nail ceiling crosspiece to top shelf of partition. Then attach crosspiece to ceiling, nailing to joists if possible; otherwise use toggle bolts. Nail inside board of each column to shelves and base crosspieces, and toenail to ceiling crosspiece and to floor. Then finish columns and install shelf partition. Columns are easier to make by merely butting sides against each other, but a better appearance will result from mitering the corners. Space below base crosspiece is filled by narrow baseboard. Finish by nailing cove molding at ceiling and base shoe at floor, mitering corners. Finish as desired.



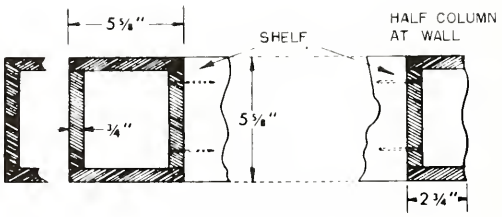




Figure **4–22** A shelf wall divider. *Reprinted from* Popular Home*—United States Gypsum Company.*

Shelves built in the form of hollow blocks, and backed with basket-woven slats from old Venetian blinds, create a partition that can conceal a kitchen or dining area in a small house. (See Figure

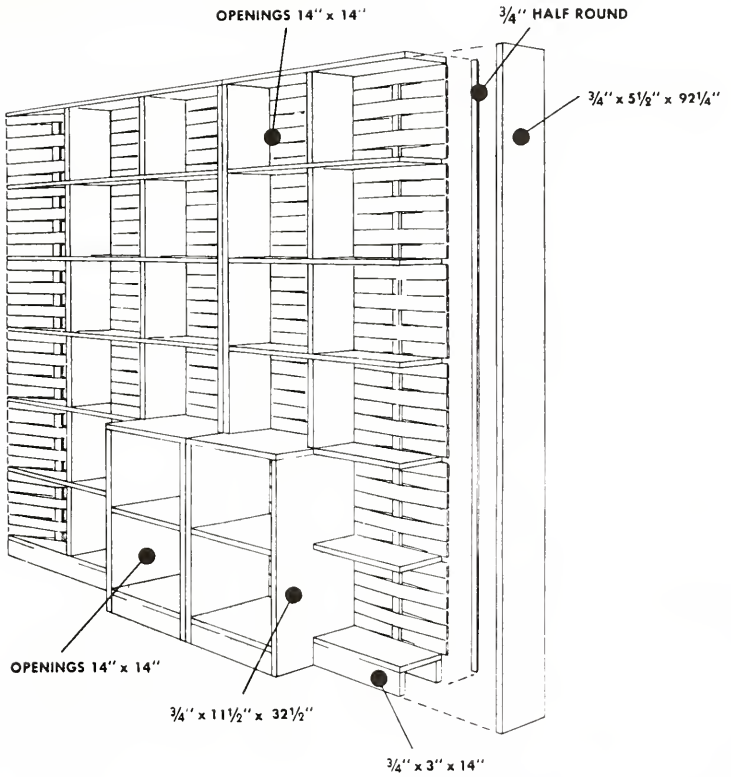



Figure **4–23** Photograph and diagram of a screen-wall with basket-woven backing. *From "Conceal It with a Screen-Wall," by Marguerite Dodd. Reprinted by permission of* Woman's Day, the A & P Magazine. *Copyright 1949. Robert E. Coates, photographer.*



4–23.) The blind slats give an illusion of circulating air and look pretty at night when the lights shine through. The frame of 1-by-6-inch stock is assembled first and the blind slats (or thin lath strips, usually ⅛ by 2⅔ inches) are woven alternately over and under ¾-inch-square strips attached to center back of each tier of squares. Ends of slats are tacked to frame, then covered with ¾-inch half round. Angle irons attach all sections to the floor. The completed screen-wall may be finished as desired.

## OTHER BUILT-INS FOR THE LIVING ROOM

**Covering radiators.** Conspicuous and unsightly radiators can be covered to harmonize with modern interiors and furnishings, but the radiator must be covered properly. A poorly designed enclosure can reduce heating effectiveness as much as 50 per cent. Before designing your enclosures, you should learn how a radiator works. Then you will be able to build your covers to get the best heating results.

A radiator supplies heat to a room in two ways: by radiating heat waves (radiation), and by heating the air (convection). Radiant heat can be compared to the sun's rays. It consists of direct heat waves that strike the surfaces and objects in a room. When these heat rays strike a cooler surface, some of them are absorbed and the rest reflected. The absorbed rays warm the surface, and the surface then reradiates its own rays.

The comforting warmth you feel from these radiant rays is supplemented by heated air. As cool air moves upward between the radiator sections, it becomes heated. Heated air rises toward the ceiling. When the air in the upper part of the room nears the heated-air temperature, it starts coming down to do its job of heating the room. Both of these sources of heat finally meet and blend. Thus, in the design of a radiator enclosure, both radiation and convection must be considered.

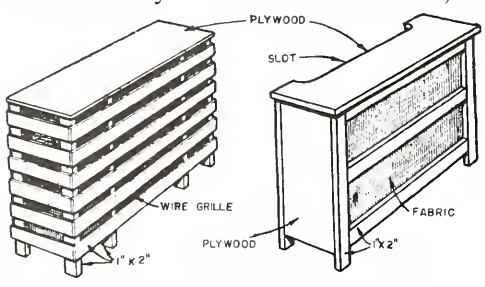



Figure **4–24** Easy-to-make radiator covers.

In designing your radiator covers (see Figure 4–24) don't box-in too much of the heating surface. Leave openings—they can be disguised with a wire grille or loosely woven fabric—so the heat can get out. Plan an opening along part of the top, at the rear, to allow hot air to escape. Or, better still, make a reflector for the radiator out of light-gauge aluminum, curving it over the top of the radiator. The reflector will not only cut down heat loss into the wall but will throw the heat forward and out. Then you can do without the slot at the top of the enclosure.

Instead of sheet aluminum, you can use heavy cardboard and aluminum foil—the kind sold in houseware stores. Glue the foil to the cardboard and then curve the cardboard over the top of the radiator. Don't let the reflector touch the radiator and keep it at least ½ inch from the wall. Use spacer blocks between the reflector and the wall.

If you want to use the top of a radiator cover as a shelf for knickknacks, books, or house plants, it's best to insulate it. Glue and tack sheet asbestos to the underside of the top to prevent the top from becoming overheated.

The finish of the radiator also affects its heating efficiency. Metallic paints like bronze or aluminum cut down heat radiation. Such paints reflect part of the heat back into the radiator instead of allowing it to radiate out into the room. Oil-base paints are better for radiators. A coat or two of oil paint may increase heat radiation by as much as 15 per cent.

**Built-in telephone units.** The 3 telephone wall units shown in Figure 4–25 provide a choice to meet different needs and situations. The narrow one (Figure 4–25, type *A*) is designed for a short wall where it is possible to work only in the 14-inch space between 2 studs. Another closes to conceal the phone and protect it from curious children (type *B*). The third, providing a built-in seat (type *C*) is especially suited to a narrow hall where it is inconvenient to have a chair.

The telephone stand with the seat (type *C*) differs from the others in construction in that it does not set into the wall. Only the 2 braces below the seat, which provide the principal support for the entire unit, go into the wall. This is accomplished by removing the wall plaster below the seat, and screwing the braces to the inside of the 2 studs exposed. After the braces are fastened, the section sawed out to make openings for them is replaced by a piece of gypsum board nailed to cleats on the studs. This piece of board can be painted or papered to match the rest of the wall.

To install type *A*, locate 2 wall studs and outline an opening on the wall in pencil, just inside of the 2 studs and about 30 inches long. Methods of cutting the opening, whether in plasterboard, wallboard, or plaster, are described in Chapter 3.

Figure 4–26 shows a variation of type *B*, with the door omitted and the upper part of the unit recessed into the wall, while the lower part protrudes. The method of supporting the unit is the same. Screw 2 thicknesses of 1-inch lumber to the sides of the studs at each end, to act as cleats (A in Figure 4–26). Screw cleats on the center stud also, though these need be only 1 thickness. The top edge of these cleats should line up flush with the lower edge of the opening in the wall. Screw sidepieces B to the end studs, just above the cleats, as shown.

Fashion bottom piece C by notching to accept center stud. Put in place by screwing to cleats A, and by screwing sidepieces B to it. Fashion the top piece by notching for the center stud. The sides of this piece are straight and should fit tight against the studs. Put top in place and screw down to sidepieces B. Cut and fit facing pieces E to cover the studs that are showing. Note that sidepieces on the center stud are the width of the depth of that stud. The front piece is wide enough to span the edges of the 2 sidepieces and the stud. The facing pieces for the 2 side studs and the top of the opening are wide enough to span the depth of the stud and the thickness of the wall.

To finish the edge of the unit use 2 quarter rounds. One quarter round goes around the opening only as far as the table top. The other continues around the entire unit.

**Built-in desks.** The desk shown in Figure 4–27 is especially designed to accommodate the business and correspondence incidental to running a family and household. There is special storage space for stationery, for writing equipment, and for letters and papers that have been received. There is an adequate writing surface which is also a closure for the desk. In a closed position it is extremely compact.

Many families could use more than one such desk. Different finishing treatments would give them variety. School-age children would like one for study purposes in their room, perhaps painted to fit into the decorative scheme.

To start building the desk, mark and cut out all pieces as shown in Figure 4–27. Drill all holes as indicated. Drawer parts R can be drilled with an extension bit or cut out with a jig saw or coping saw. Cut a rabbet at both ends of parts H and

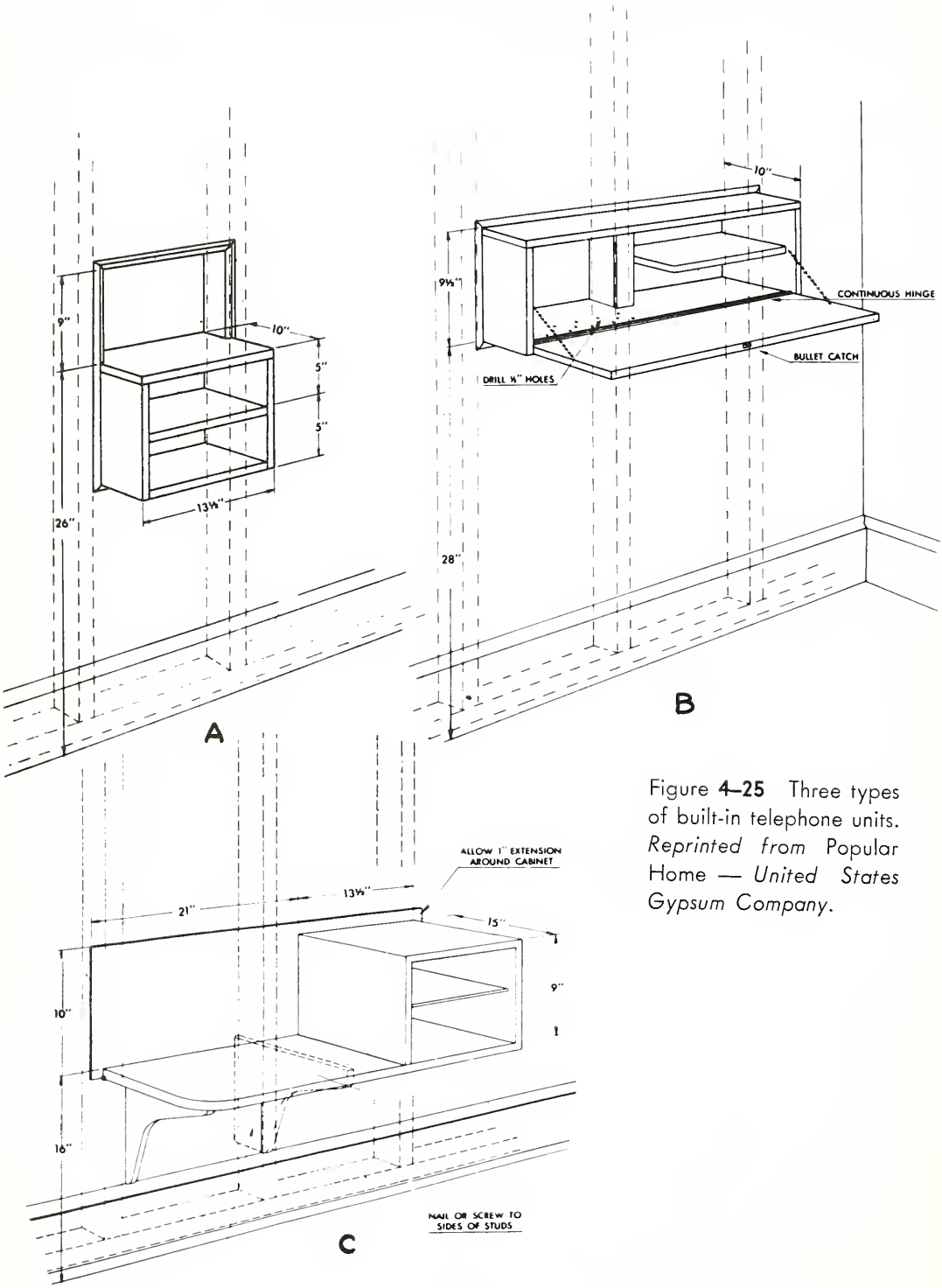
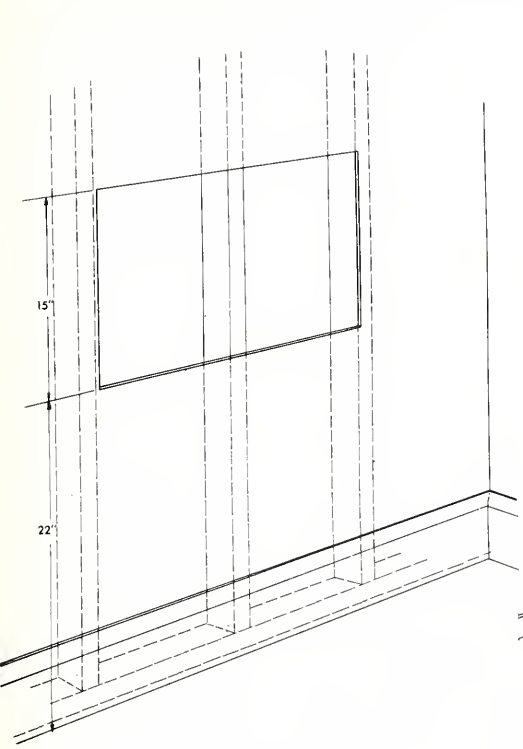
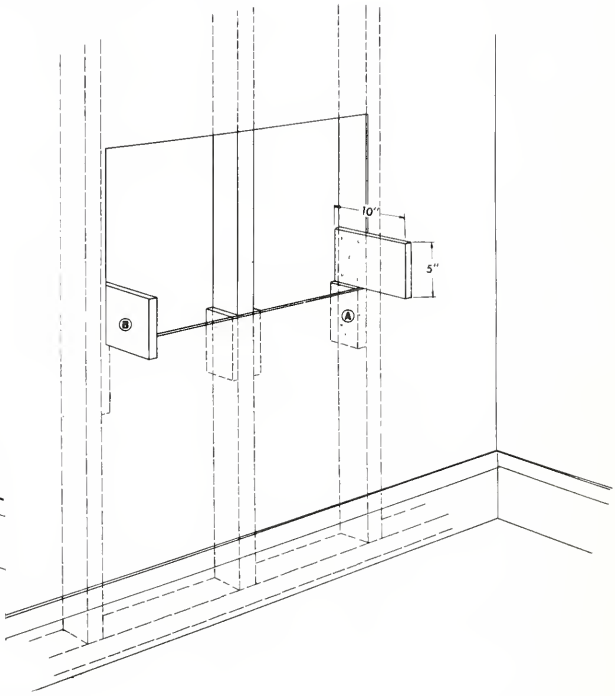
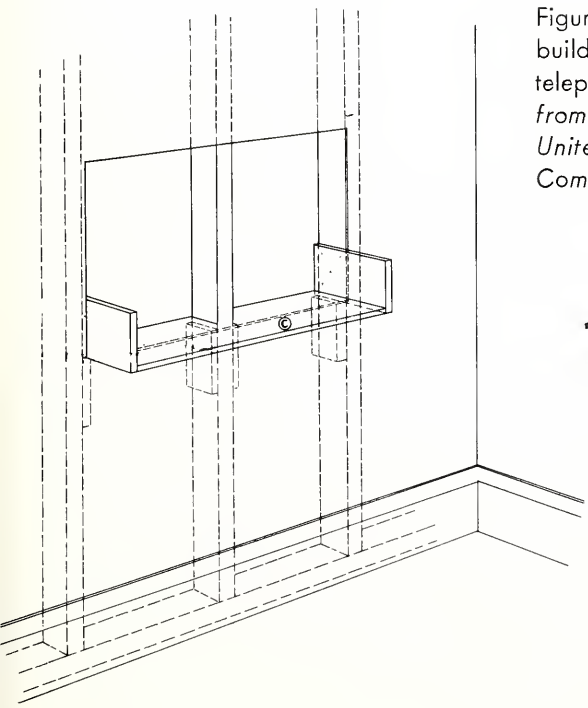



Figure **4–25** Three types of built-in telephone units. *Reprinted from* Popular Home — *United States Gypsum Company.*



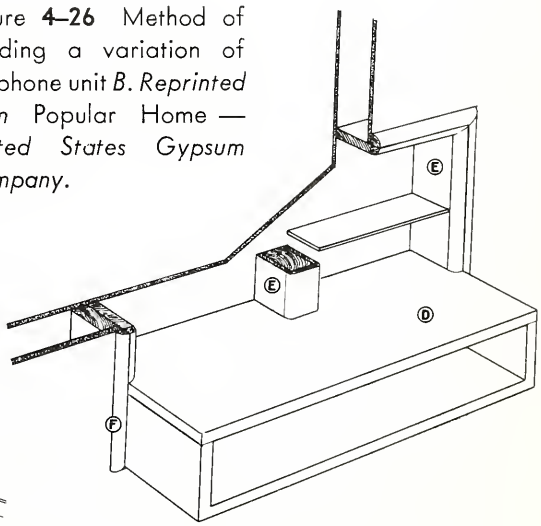



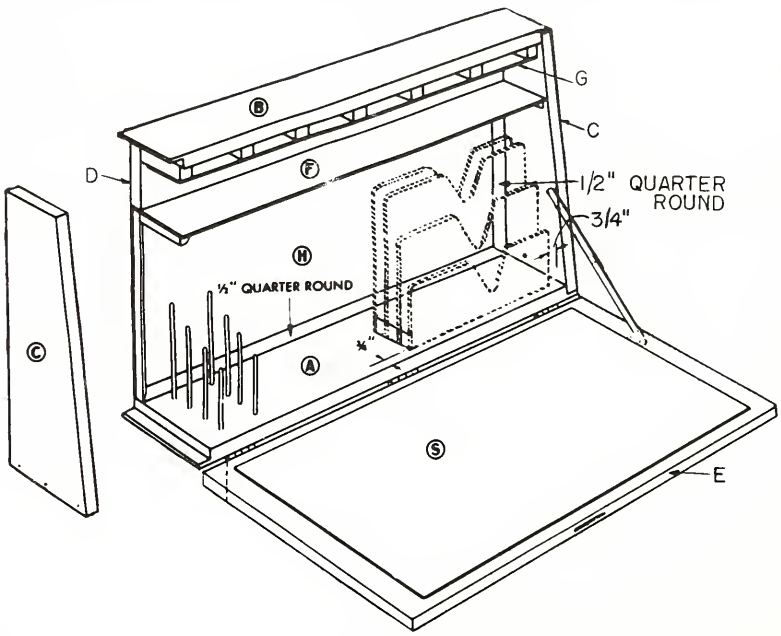

Figure **4–26** Method of building a variation of telephone unit *B*. *Reprinted from* Popular Home — *United States Gypsum Company.*

B. If no machine is available, the rabbet can be cut by hand. Clamp a piece of wood (approximately 1 by 2 by 8 inches) exactly ¾ inch from the end edge and parallel to the end. Holding handsaw flat against this guide, make a straight vertical cut ½ inch deep. Remove the cut section carefully with a chisel. Glue and screw sides C to bottom A and top B, using No. 8 screws 1½ inches long. Countersink screws and fill with wood putty. Screw part D under top B, flush with back edge of B. Then nail drawer bottoms M to drawers R.

Set framework upside down so it rests on top B. Place the 7 drawer dividers 15/16 by ¾ inch alternately with drawers RA along length of top B, starting with a drawer divider in each corner formed by C and B. The 15/16-inch side should be vertical; the ¾-inch side horizontal. Insert a piece of paper between each side of each drawer and adjoining divider. Nail and glue drawer dividers to underside of top B, using 1¼-inch No. 16 brads. All pieces should touch back D. Now nail drawer support G to drawer dividers with ¾-inch No. 18 brads. This piece should be flush with front of drawer dividers. Next nail and glue the fronts of drawers N and P in place, leaving approximately 1/32 inch of space between each piece. The 2 larger pieces N belong at either end. Now pull out drawers, remove strips of paper, and sand all exposed edges.

Nail shelf F to the under edge of part D, flush with the back of D. Sand front edge of shelf before nailing in place. Next, nail 4 pieces of ½-inch quarter round (2 pieces 27 inches long and 2 pieces 11 inches) 3/16 inch in from the back edge of pieces A, C, and D. Miter corners at a 45-degree angle. The resulting recess will receive the hardboard back H. (Do not put back in at this time.) Using ¾-inch brads, nail into position the ½-inch quarter rounds, 3 inches long, that support shelf F on the sides.

Lay frame on its back, bottom A toward you. Place desk lid E on it, flush on all sides. Screw 3 hinges (2 by 1¾



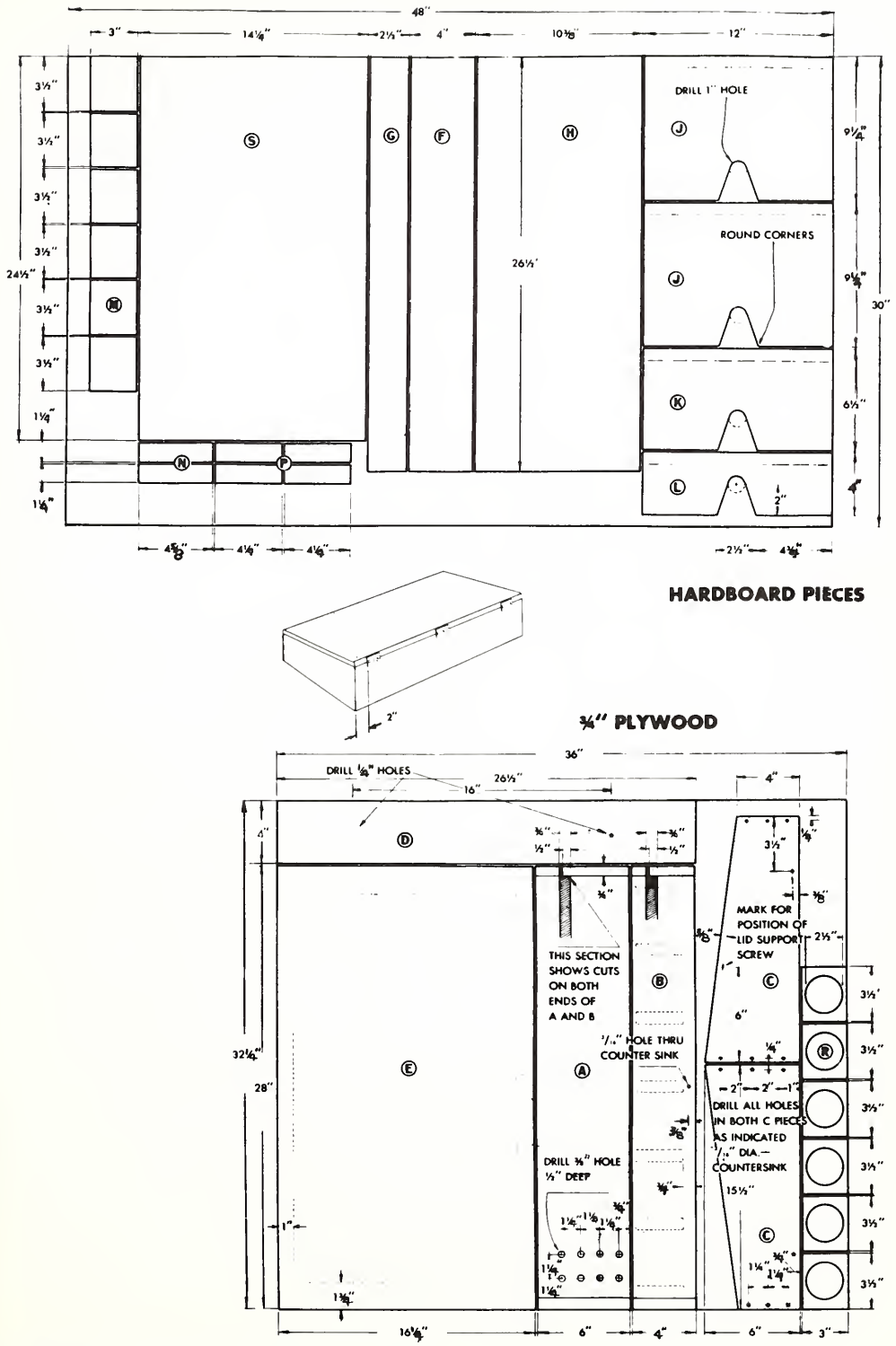
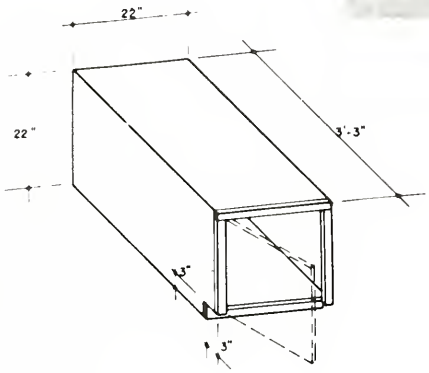


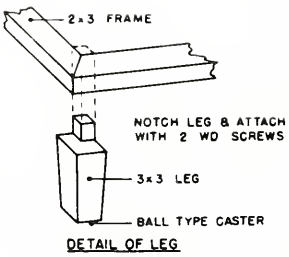

Figure **4–27** Small built-in desk. *Reprinted from* Popular Home—*United States Gypsum Company.*

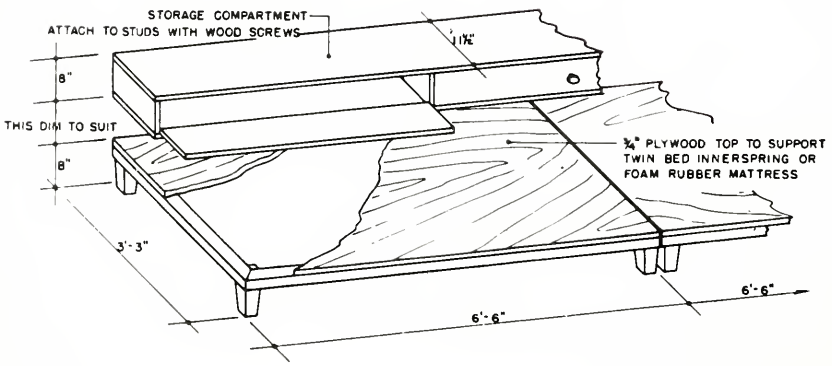
inches) in place as shown in drawing. Use ¾-inch No. 6 screws into bottom A and 1-inch No. 6 screws into lid E. Top edge of hinge should be ⅛ inch below outside surface of lid E. Screw metal desk-lid support arms in place. First screw onto part C, left and right, as marked in layout. Close the desk and mark on E, through the open back, the proper position of the other end of the lid support arm. Open lid and screw in place on E. (If desired, a chain or strap can be used instead of lid support, but if any other than 5-inch lid support is used, adjustments in position will have to be made.) Then screw spring catch in place.



Figure **4–28** Built-in couch with bedding-storage unit.



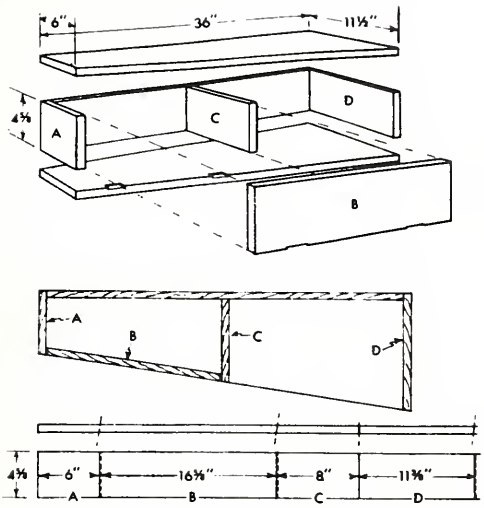



Figure **4–29** Diagonal shelf and cupboard adjoining entrance hall.

Through open back locate proper position for mating part. Next, round 1 end of all dowels and glue in place as shown.

Starting with 1 of the 2 largest boards, marked J, glue and nail 1 strip, ¾ by ¾ by 12 inches, flush with the bottom edge. Add other large board J, and follow this with ¾-by-¾-inch strip and affix part K. Strip and finish with part L. (See dotted drawing of this paper-holder assembly in place in desk.) Screw hinge to paper holder flush on both ends and screw other wing of hinge to bottom of cabinet, approximately ¾ inch from right side and ¾ inch from front. Next, fit and nail hardboard back H in place with ¾-inch No. 18 brads. Nail hardboard covers in place on the inside of desk lid. Round top edges of this board with sandpaper.

Sand all surfaces, round all corners, and finish as desired. Fasten desk to wall through heavy back piece D with ¼-inch No. 14 roundhead wood screws through washers, into the studs.

**Couch and end table.** The couch shown in Figure 4–28 is so constructed and designed that by day it is a handsome piece of furniture that enhances the charm of any room, yet at night it can serve as an additional bed. As illustrated, 2 bed units are used, but the couch can be made of only 1, if desired. The base may be of the type shown or may be solid. A twin-bed innerspring or foam-rubber mattress makes a fine cushioning for the coach.

As sidepiece for the couch, the chest shown in Figure 4–28 serves also to store guest bedding and pillows.

**Diagonal cupboard.** A diagonally shaped storage shelf (Figure 4–29) is a clever living-room detail adjoining the entrance hall. Screwed to the wall, it makes a cupboard for gloves and car keys and a shelf for incoming mail.

**Window cornices.** Simple frames at window tops can work wonders in improving the appearance of the living room. The size and dignity of windows are enhanced by extending the cornice beyond the width of the window. Another advantage is that less window area is obscured by drapes, and more light and air can enter. Often it is advisable to make the cornice deep enough to receive a Venetian blind or a shade as well as the drapery, as shown in the cross section in Figure 4–30. This permits the blind to be drawn up over the window head, and thus opens even more of the window.

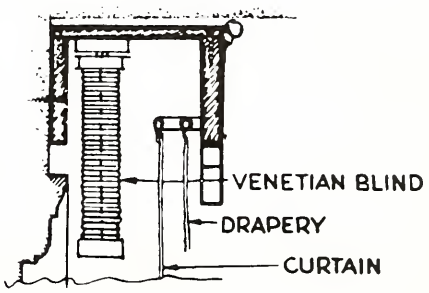



Figure **4–30** Window cornice for a Venetian blind.

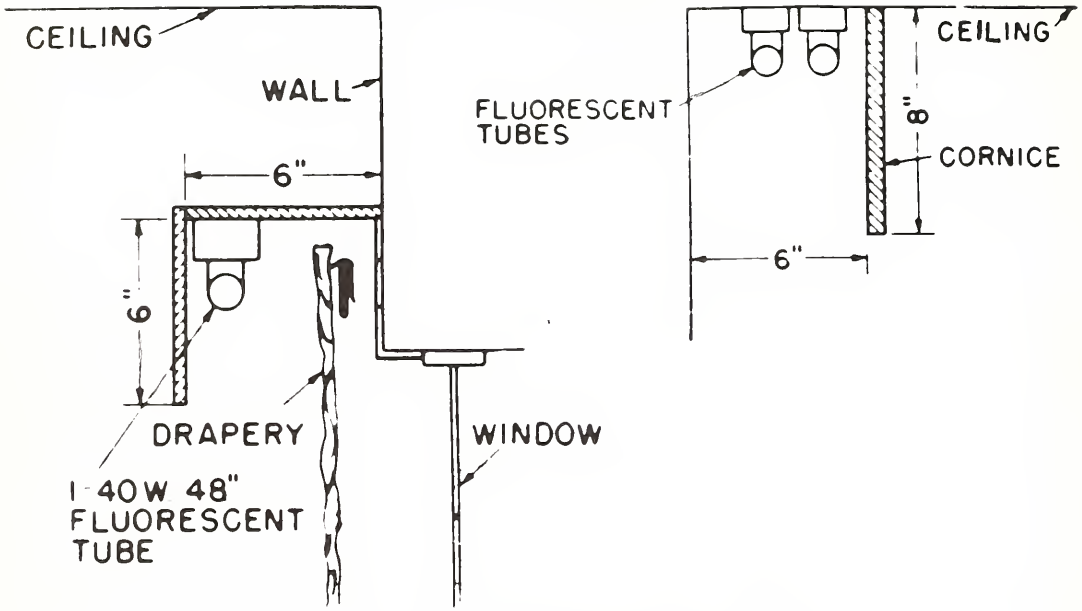



Figure 4–31 Window cornice, showing drapery and lighting details.

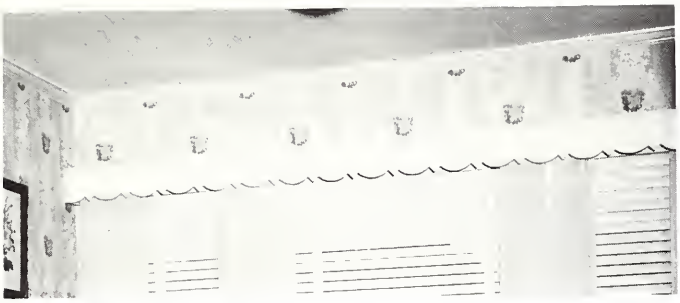
In a low room in which the windows should be stressed, always build the cornice right up to the ceiling; but if the ceiling is fairly high, the cornice box may be placed between the window head and the ceiling.

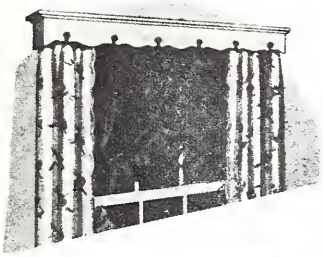
In addition to housing draperies, any of the cornices shown can be arranged for cove lighting by fastening a wooden strip on the back to provide a mount for lamp sockets (Figure 4–31).

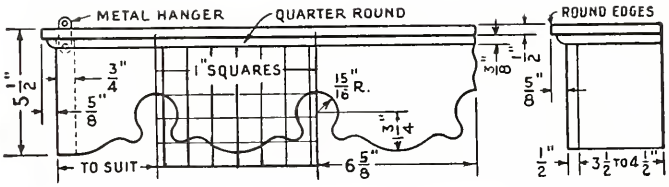
A very simple cornice box may be made by capping a flat board with a piece of the picture molding used in the room. This should be placed at the same level as the room molding. When applied moldings are used, simple butt-joined construction is satisfactory, as the joints are covered by the moldings. Without a molding, a mitered corner is most professional; but you may simply butt the ends and round off the corners. In this style of cornice a cutout skirt is good, and various profiles may be used. A few are shown in Figure 4–32.

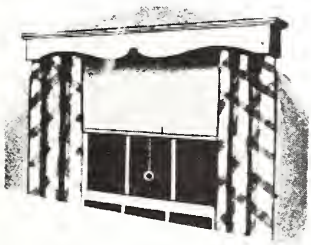
The simplest way to install the cornice box is to provide it with a back, and to drive screws through the back where they will catch studs in the wall. If the cornice box is tightly put together with glue in all the joints, the leverage developed will not be too great, even with heavy curtains. Angle irons or shelf brackets may be added for additional support; use 3-by-3-inch or 4-by-4-inch irons, according to the size of the window.

**Built-in lighting.** Proper lighting in your living room makes possible dramatic highlighting of decorative features and added emphasis to room details. More effective use and better distribution of light in working areas gives greater "see-ability" and saves eyesight. The most recent advance in lighting has been the concealed or built-in type. Such lighting includes cove, cornice, valance, pinhole spot, and recessed ceiling designs. Many of these lighting features are shown in the photographs in this book.







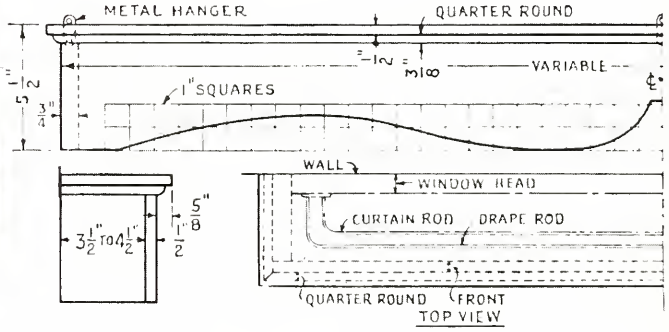
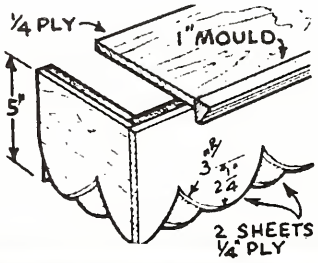



Figure **4–32** Several types of window cornices suitable for any room in your house.






# CHAPTER 5

## KITCHEN–LAUNDRY AREA IMPROVEMENTS

IT IS probably quite safe to say that to the mind of the lady of the house the kitchen is the very heart of the home—and when you consider it from her point of view she is quite correct. Cooking 3 meals a day takes more time than any other housekeeping task, according to the U. S. Bureau of Home Economics. Thus it is important to the homemaker that her kitchen—or "workshop"—be so arranged that she can accomplish the maximum amount of work with the minimum amount of effort in the shortest possible time.

A modern kitchen is well within a modest budget if you are willing to do most of the work yourself. You can build the cabinets, or purchase and install them, at a considerable saving. In either case, the arrangement should be planned to save steps and to present a pleasing appearance. Every hour of planning will be time well spent.

## ORGANIZATION OF THE KITCHEN

To be efficient in use, the kitchen must, first, be clear of unwarranted traffic, at least through the work areas; second, it must have nonworking and secondary-task areas separated from routine working areas; and third, the work areas should be arranged in work-group centers. The following points should also be considered:

1. Arrange equipment so that the homemaker moves continuously in one direction, starting where food is stored and prepared.
2. Place pieces of equipment as close together as possible so that there will be a continuous counter surface.
3. Provide adequate storage space allowing sufficient clearance above the counter surface so that the homemaker may work in comfort and sufficient toe space at the floor.
4. Locate the sink, if possible, between the place where food is stored and prepared and the place where it is cooked and served.

Sometimes, for best results, it is advisable to change the location of a window or door, or the direction in which a door swings. A door should not swing into a work area or interfere with the use of cabinets and appliances. Two doors are preferable to 3, especially in small

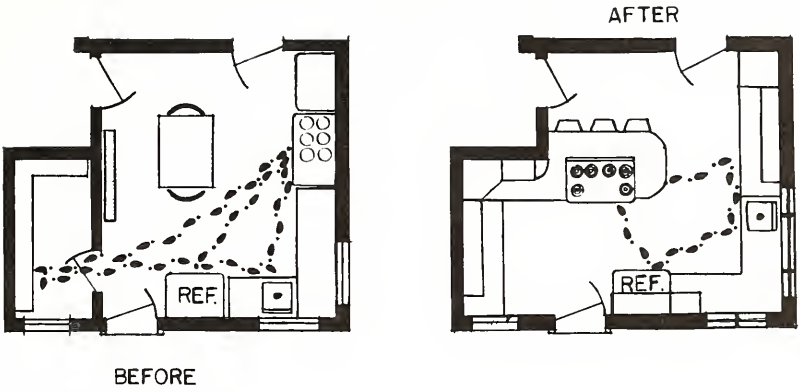



Figure **5–1** Rearrangement of a kitchen, showing how planning saves steps. *Reprinted from* Popular Home—*United States Gypsum Company.*

kitchens. If possible, they should be located so that other household traffic will not cross kitchen work areas.

**Work centers.** Work in any kitchen may be divided into 3 major tasks: (1) food storage and preparation; (2) cooking and serving; and (3) cleaning. Wherever practical, space should be provided also for (4) utility storage and (5) planning. And in many homes a space made available for eating in the kitchen is necessary or desirable.

The organization within each center is just as important as its relation to the other centers. Food supplies, utensils, items of equipment, dishes, etc., must be grouped and arranged properly in each center; otherwise the kitchen loses some of its over-all step-saving efficiency.

*Storage and preparation center.* This area is planned around the refrigerator, where perishable food is kept, the storage cabinets for staple supplies and utensils, and the counter surfaces where food is prepared for cooking. Baking dishes, salad molds, cake tins, pie pans, flour sifter, graters, and mixer should be stored here where they are first brought into use.

Proper arrangement at this center makes it possible to prepare either a single recipe or food for an entire meal with a minimum number of steps. There should be generous counter surface next to the refrigerator for food preparation. The ideal arrangement is a continuous counter surface from refrigerator to sink, as so much preparation—paring vegetables, cleaning beans, and similar tasks—requires the use of the sink.

*Cooking and serving center.* This center is planned around the range, with shelves or cupboards for cooking utensils and serving dishes. The location should be near the eating place in the kitchen, if any, or near the door to the dining room.

Frying pans, griddles, pot lids, cooking cutlery, coffee maker, teapot, and toaster are kept at this center.

*Cleaning and dishwashing center.* This center is planned around the sink and dishwasher (if one is to be installed), with stack counter area, refuse receptacle, and drainboard adjoining, and cabinets for dishes within easy reach. This center should always be located between the food storage and preparation and the cooking and serving center.

A generous counter surface, so neces-

sary in the cleaning-up process, should flank both sides of the sink. This center should house the silver, paring knives, saucepans used for cooking with water, cleaning materials, and a ventilated compartment big enough for a week's supply of potatoes. Wall cabinets at the cleaning center should hold all glassware and china not stored at the cooking and serving center.

Wherever possible, sinks should be equipped with double drainboards. A backsplasher from 3 to 8 inches high should be used back of the sink. Lower ones, from 1½ to 3 inches high, at the back of all counters make cleaning easier. The dishwasher is usually placed at the right of the sink, although it can be located at the left when necessary.

*Utility storage center.* Some arrangement, such as a built-in closet, may be designed to accommodate bulk produce such as sacks of potatoes, flour, and sugar, canned goods and equipment not stored

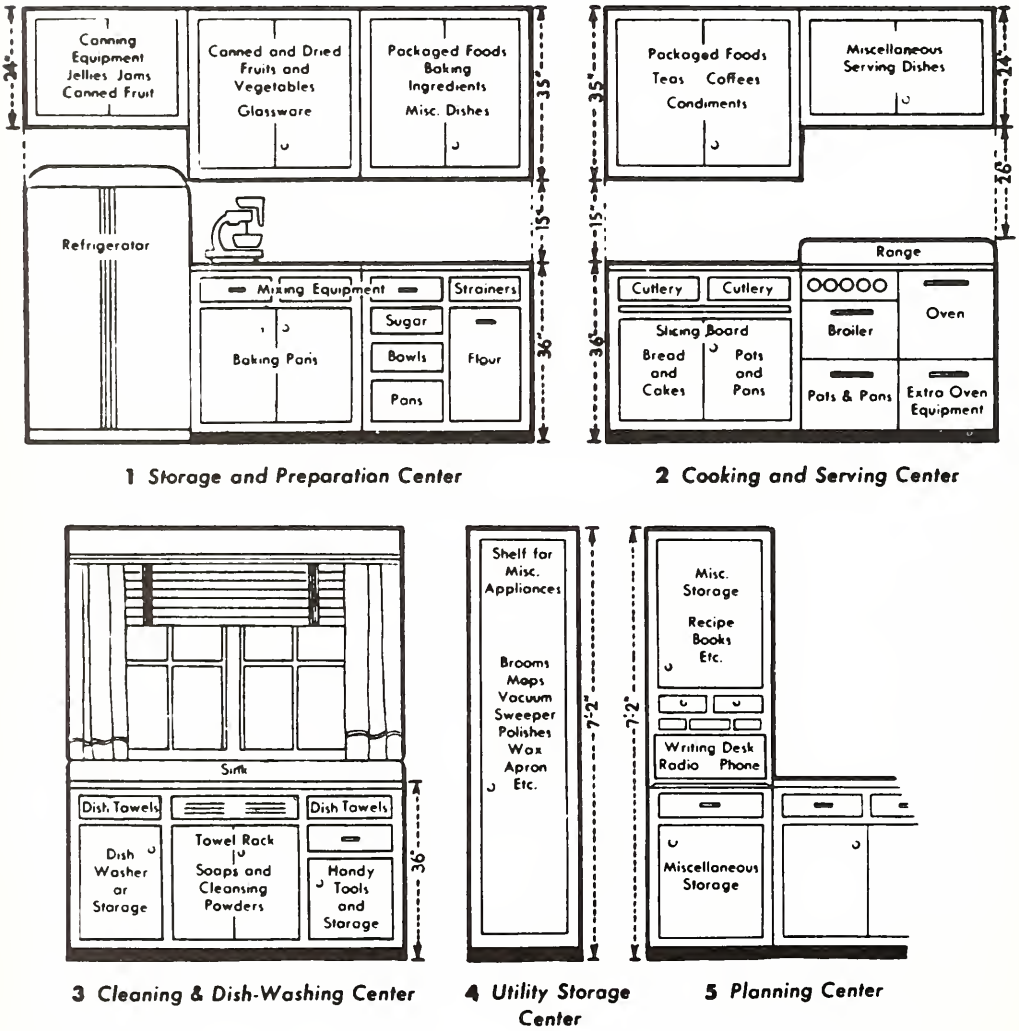



Figure **5–2** Five major kitchen centers.

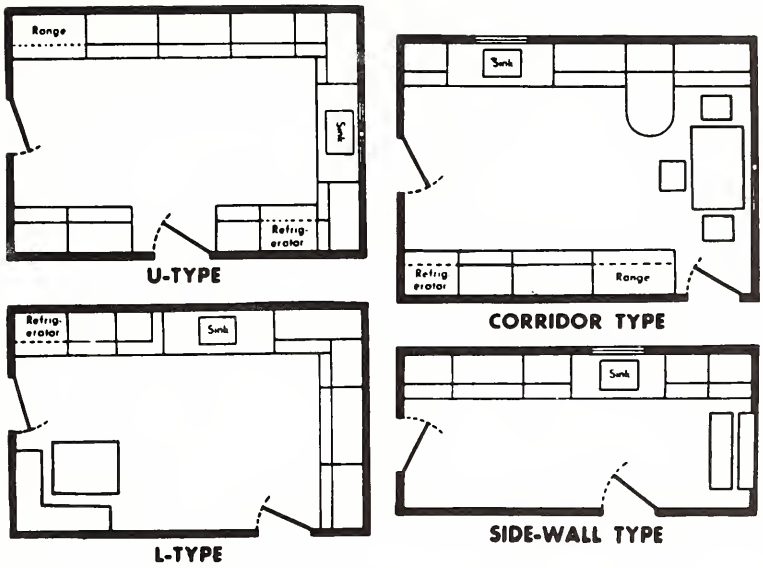



Figure **5–3** Four basic kitchen types.

at one of the 3 primary centers, large serving platters, and the table service used on special occasions.

*Planning center.* Here the housewife finds a convenient spot for her office. The convenience of having cookbooks, recipes, writing equipment, household bills, and a telephone at hand makes easier the social and domestic tasks requiring her attention.

**Eating.** In the small home, to save space, the dining area can be combined with either the kitchen or the living room. In the larger home, an eating center in the kitchen in addition to the dining room is highly desirable. It should not interfere with any of the 3 major functional centers described, and should not be larger than necessary to accommodate essential furniture.

**Kitchen types.** Today's kitchens are of 4 basic types—the U type, the L type, the corridor (or 2-wall) type, and the side-wall (or 1-wall) type. By studying these kitchen layouts (Figure 5–3) you will find one that is suited to the shape of your present kitchen. The new arrangement will depend largely on the location of the sink, since extensive plumbing changes are expensive.

The U type is the most efficient, compact arrangement. Everything is close at hand. Note the order of the work areas. The space between parallel work surfaces should be at least 4 feet.

The L type is used where 2 adjoining walls are available for cabinets and other kitchen equipment. This plan provides for a breakfast nook or luncheon bar.

In the corridor type, cabinets and appliances are placed along 2 parallel walls, usually with the sink on one side and the refrigerator and range on the other.

The side-wall type is useful for small homes. All work centers are on 1 wall in their proper order—storage, preparation, cooking, and serving.

**Lighting and ventilation.** For adequate illumination, the window area of a kitchen

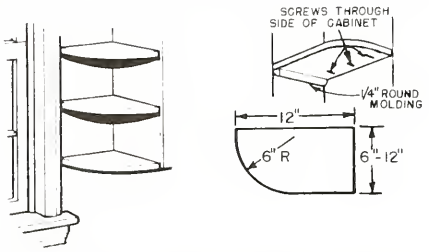



Figure **5–4** Rounded shelves, used to relieve the "boxed-in" appearance between a window opening and wall cabinet units. The shelves are made of ¾-inch plywood. *Reprinted from* Popular Home*—United States Gypsum Company.*

should not be less than 20 per cent of the floor area. One counter, at least, preferably the preparation and cleaning counter, should be well lighted by a window. Most women prefer to have the sink at a window but this is not essential.

Windows never should be "boxed in" by wall cabinets; a much better appearance results when cabinets are spaced at least 9 inches from the window edges and rounded shelves are installed. (See Figure 5–4.)

*Exhaust fan.* A kitchen exhaust fan gives a complete change of air in a few minutes to eliminate cooking odors, excess heat, and humidity. The air exhausted by the fan is automatically replaced by fresh air drawn in through an open window or from other rooms. If the range is against an outside wall, the fan should be placed directly above the range. If there is a cabinet over the range a metal hood can be used and a duct carries the air through the cabinet to the wall. If the range is on an inside wall, the duct passes through the drop ceiling over the cabinets (see page 83 for constructing a drop ceiling).

Figure 5–5 shows how to install the fan in the outside wall. Plan the opening in the wall before doing any cutting. Check from the basement to determine whether there are pipes or wires between the wall studs of the desired location; if there are such obstructions it is best to select a different location. Drill or cut a small hole to locate a stud exactly, and lay out the opening above 12 to 18 inches above the top of the range. Frame the opening between the studs to make the mounting more rigid. For walls more than 11 inches thick, or if an air space exists between wall box section and fan section, the space should be lined with a No. 30 gauge metal sleeve soldered along its seam. Any metal or roofing dealer can supply this.

To wire the fan, run in wires or conduit after the opening is made in the wall. Be sure to connect wires in the conduit box white to white and black to black. Fasten the conduit box into the wall box with the nuts furnished. Generally a pull chain is used that operates both the switch and the opening and closing of the outside door. The fan should be installed according to the manufacturer's instructions.

*Lighting fixtures.* The kitchen must have effective lighting. A central ceiling fixture should be installed to provide general room illumination. But general illumination alone is not sufficient since it

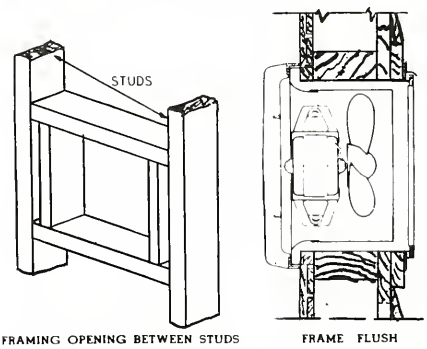



Figure **5–5** Method of installing an exhaust fan in an outside wall: *left*, framing the opening; *right*, the fan installed, flush with the wall. *Courtesy of American Radiator & Standard Sanitary Corporation.*

creates annoying shadows at the range, sink, and other work areas. At these work areas, supplementary light fixtures are needed to overcome the shadows. Counter surfaces under wall cabinets should be lighted by lamps built into the bottom of the cabinets; these lamps should be concealed either by mounting them in recess under the wall cabinet or by an extended apron on the front of the cabinet. Fluorescent lamp units are desirable at these locations; use either the 15-watt, 18-inch lamp or the 30-watt, 36-inch lamp, depending on the length of the cabinet.

A control switch should be located at each important entrance. Counter lamps may be controlled individually or all by 1 wall switch. It is much better to have too many electrical outlets than too few, and at least 2 should be provided on each wall. Locate several along the counters, using multiple-outlet strips. Others should be provided at the range, refrigerator, and exhaust fan, and for using such equipment as radio, toaster, and ironing board. A sunken outlet also may be installed for an electric clock.

## KITCHEN CABINETS

**Cabinet storage requirements.** Wall cabinet storage is the cabinet space above the counter surface. Approximately 6 square feet should be allowed for each occupant, plus 12 square feet for entertaining and accumulation. Wall cabinet storage should never be less than that required for normal occupancy of 3 persons, or 30 square feet (6 square feet of shelf area $\times$ 3 persons $=$ 18 $+$ 12 square feet $=$ 30 square feet). Add 6 square feet for each additional member of the household, if it exceeds 3 persons.

Base cabinet storage is the cabinet space below the counter surface; it is calculated on a linear foot basis. Base cabinets normally occupy all the space beneath upper wall cabinets which is not required by the range, refrigerator, sink, and dishwasher.

If there is a shortage of wall cabinet storage, due to window locations, make up the difference by installing an additional base cabinet, a tall shelf cabinet, or a storage closet elsewhere in the room (usually in a corner). Substandard storage space reduces efficiency and makes for poor housekeeping.

**Cabinet dimensions.** See Figure 5–6. The standard height for base units is 36 inches. This is a good working height for most women, although very short women may want 35 or even 34 inches. The wall units should be about 30 inches in height. This allows for 3 shelves that can be reached from the floor, if the cabinet is hung 16 or 18 inches above the base cabinet.

Never hang the top less than 16 inches above the base unit, as this space would then be too low for items like an electric mixer, and articles placed at the back of the space would be inaccessible. Increasing the clearance over the cooking range adds to the convenience of working. If you have an electric range, increase the clearance by about 6 inches, *i.e.*, to 22 or 24 inches; this permits the use of 24-inch-high cabinets over the range section. Gas ranges, however, require at least a 30-inch clearance because of their greater fire hazard. This still permits the use of an 18-inch wall cabinet over them, if necessary, but none at all is preferable.

When planning cabinets, a space 36 inches wide generally is allowed for a

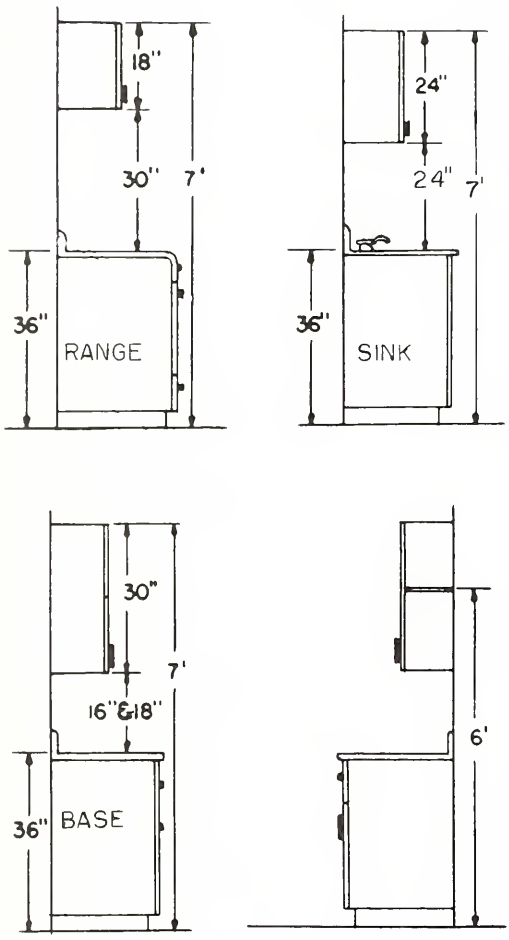



Figure **5–6** Standard cabinet heights.

refrigerator, with a 6-inch clearance above it. Normally, a 42-inch space is allowed to accommodate the range, but if it is set between cabinets or a cabinet and a wall, this allowance is not enough to permit cleaning the sides of the range; a 6-inch space at each end is best.

**Installing ready-made cabinets.** Before purchasing ready-made cabinets, have a dealer go over your plans and check all dimensions so that the units will fit properly. The sizes available in both wood and steel cabinets are shown in the chart.

SIZES AVAILABLE IN READY-MADE WOOD AND STEEL CABINETS

(dimensions in inches)

| Type cabinet | Widths | Height | Depth |
|---|---|---|---|
| Wall | 15, 18, 21, 24, 27, 30, 36, 42 | 18, 30, 36 | 12, 13 |
| Base | 15, 18, 21, 24, 27, 30, 36, 42, 48 | 36 | 24 to 25 |
| Counter | | | 24 to 27 |
| Corner wall units | 24 and 26 both walls | 30, 36 | 12, 13 |
| Corner base units | 28, 29, 33, 36 both walls | 36 | 24 to 25 |
| Utility | 18, 21, 24 | 78, 84 | 12, 13, 18, 21, 24, 25 |
| Sink units | 24, 30, 36, 42, 48, 54, 60, 72, 84 | 36 | 24 to 25 |

Most steel cabinets are attached to wooden or metal hanger strips (see Figure 5–7) which are nailed or screwed horizontally into wall studs. The hanger strips must be absolutely level. In some cases, a hanger strip is used individually on each cabinet; in other cases, it may extend to hold more than one. In still other installations, the cabinets are screwed directly to the walls, with screws driven into studs.

In the installation of metal cabinets, filler strips (see Figure 5–8) are used. If possible, start from a corner.

Corner space can be utilized with a corner cabinet having a parallel-to-wall or 45-degree front, in which case the adjacent cabinets are simply fastened to it. (Avoid locating a corner cabinet next to a refrigerator, as this would interfere with opening the cabinet door.) If your installation does not include corner cabinets, butt 2 straight cabinets together at

right angles and fasten them to a metal corner filler strip and to a corner bottom plate.

Bolt the various cabinets or units together before screwing them to hanger strips or wall. Most steel cabinets are provided with removable knockouts for the bolts. If not, holes must be drilled. Wooden cabinets are fastened together with screws. Before screwing the cabinets permanently, check with a level to be sure that the front and sides are plumb. Often it is necessary to use shims behind the cabinets where pastered walls are uneven.

Avoid having a cabinet butt tightly against an end wall, as this would interfere with the operation of doors. The clearance space between cabinet and wall

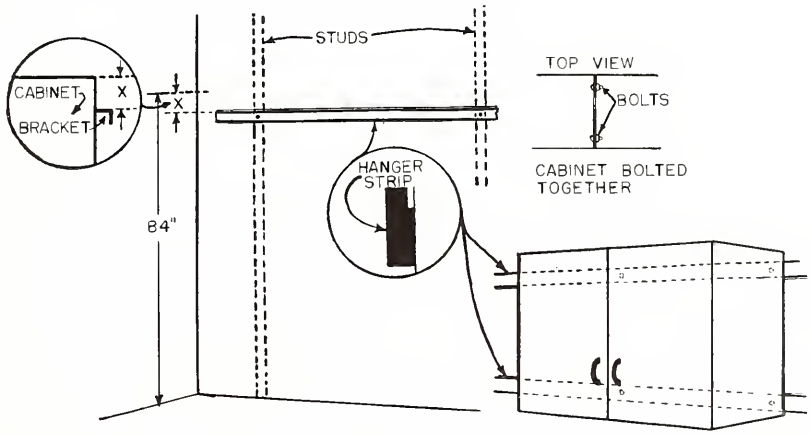



Figure **5–7** Locating and installing ready-made cabinets. *Courtesy of American Radiator & Standard Sanitary Corporation.*

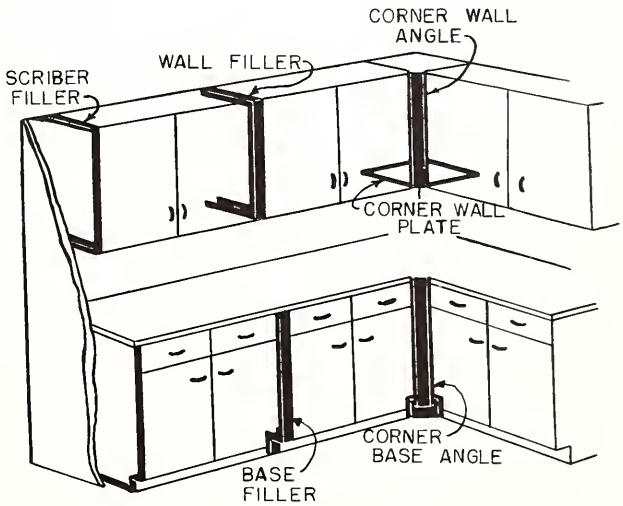



Figure **5–8** Filler strips for steel-cabinet installation. *Courtesy of American Radiator & Standard Sanitary Corporation.*

is concealed with a scriber filler strip. If the wall is uneven, the strip is held in position, scribed to conform to the wall surface, and then cut with tin shears and fastened in place. When it is necessary to fill a gap of a few inches between cabinets to stretch them, a wall filler strip is used; these strips come in various widths.

Base cabinets installed on uneven floors should be shimmed with wooden wedges to get them perfectly level, then screwed to wall studs. A base shoe will hide the exposed crack where the cabinet is raised above the floor.

If the corner space is not filled with a base corner cabinet, then a counter support cleat is nailed or screwed to the wall studs. A single counter can extend over the entire assembly, although in some packaged units individual cabinet counters are provided. Where counters butt against sinks, wedge-shaped filler strips coated with sealing compound assure waterproof joints. Backsplash on sinks and counters may be integral with them, may be attached as separate units, or may be provided by covering the wall with linoleum or plastic coverings.

**Building your own kitchen units.** For simplest cabinet construction, use ¾-inch plywood together with stock lumber. (Thinner plywood or hardboard requires additional framework and considerable joinery.) White or knotty pine, birch, or gum may be used instead of plywood. When pine is used, the boards should be tongued and grooved, then glued together.

Counter surfaces may be of laminated plastic, wood, linoleum, tile, Monel, stainless steel, or hardboard. Each of these materials has its advantage, either from the standpoint of cost or effectiveness. Wood and tempered hardboard are the least expensive. Linoleum and tile cost slightly more but are less absorbent of

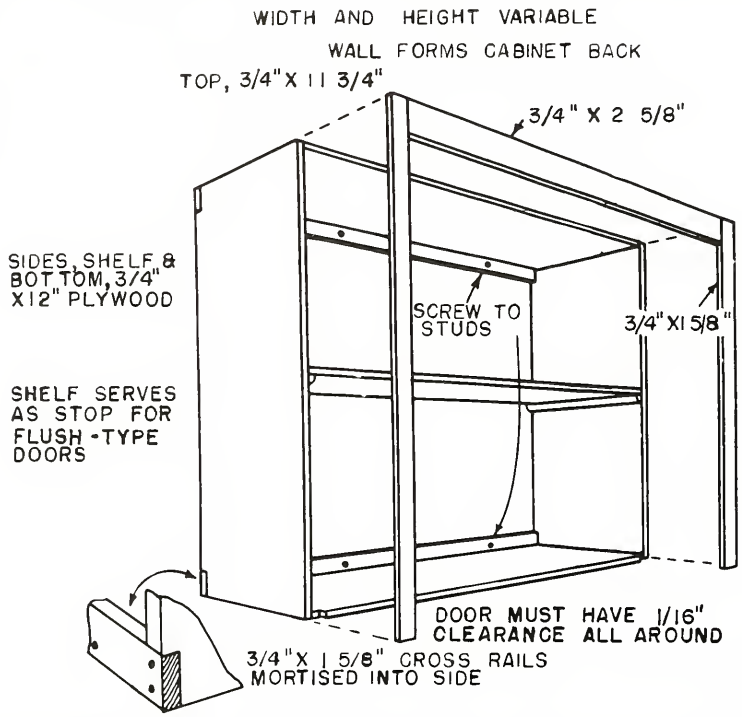



Figure **5–9** Single-door wall cabinet. *Courtesy of Skil Corporation.*

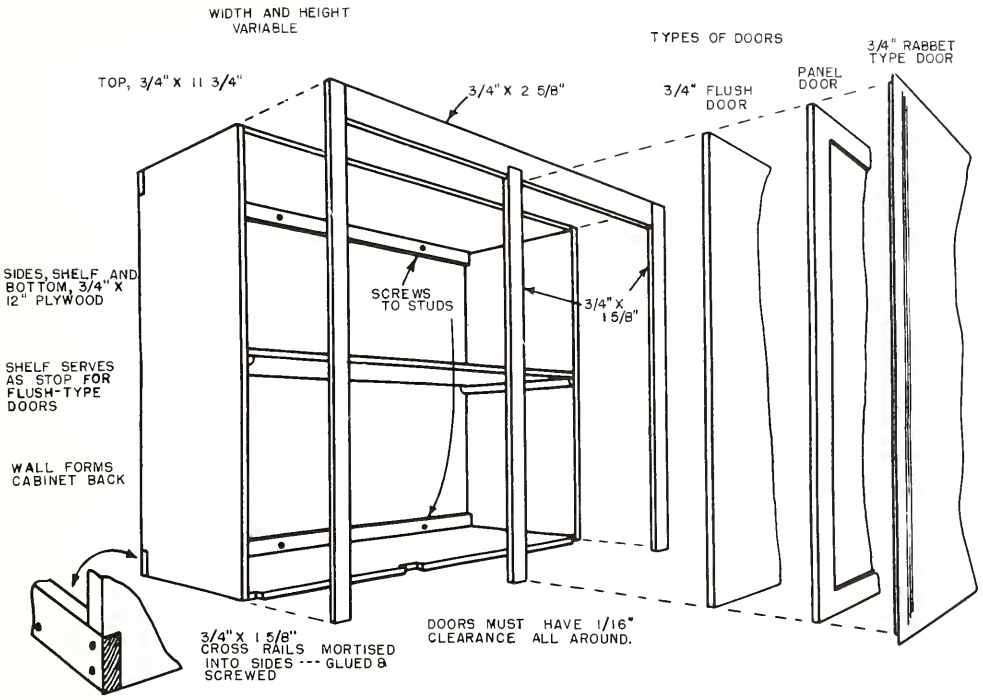



Figure **5–10** Double-door wall cabinet.

liquids and sink acids. Laminated plastic, Monel, and stainless steel are still more expensive but are well worth the difference in investment because of their durability and appearance; these three materials ensure long years of satisfactory service. Flat-rimmed sinks may be installed in conjunction with any of these materials, with the counter surface and sink combined in one integral unit. Methods of working with laminated plastic, linoleum, and hardboard are described in Chapter 3.

**Making wall cabinets.** The top, bottom, sides, and doors should be cut from a 4-by-8-foot, ¾-inch plywood panel. The height of wall cabinets varies as explained under *Cabinet dimensions*, page 76.

Single-door wall cabinets (Figure 5–9) can be 12, 15, 18, 21, or 24 inches wide. The shelves are supported at each end by 1-by-2-inch cleats fastened to the sides before assembly.

Double wall cabinets (Figure 5–10) are made in the same manner as single cabinets. They can be 24, 30, 36, or 42 inches wide.

In the corner wall cabinet (Figure 5–11) the sidepieces of the doorframe are

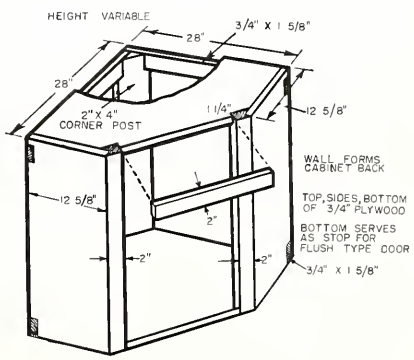



Figure **5–11** Corner wall cabinet. *Courtesy of Skil Corporation.*

hardwood, rabbeted, glued, and screwed to the side panels. The top of the cabinet extends 1 inch into the doorframe so that ¾-inch inserts will fit flush with the front.

To install wall cabinets, locate the center of the wall studs; it is then a simple matter to drill holes in the top and bottom rails of the cabinet so that they can be fastened to the studs. When 2 or more cabinets are installed as a unit, use 1-by-2-inch spacers between the units to allow the doors to swing.

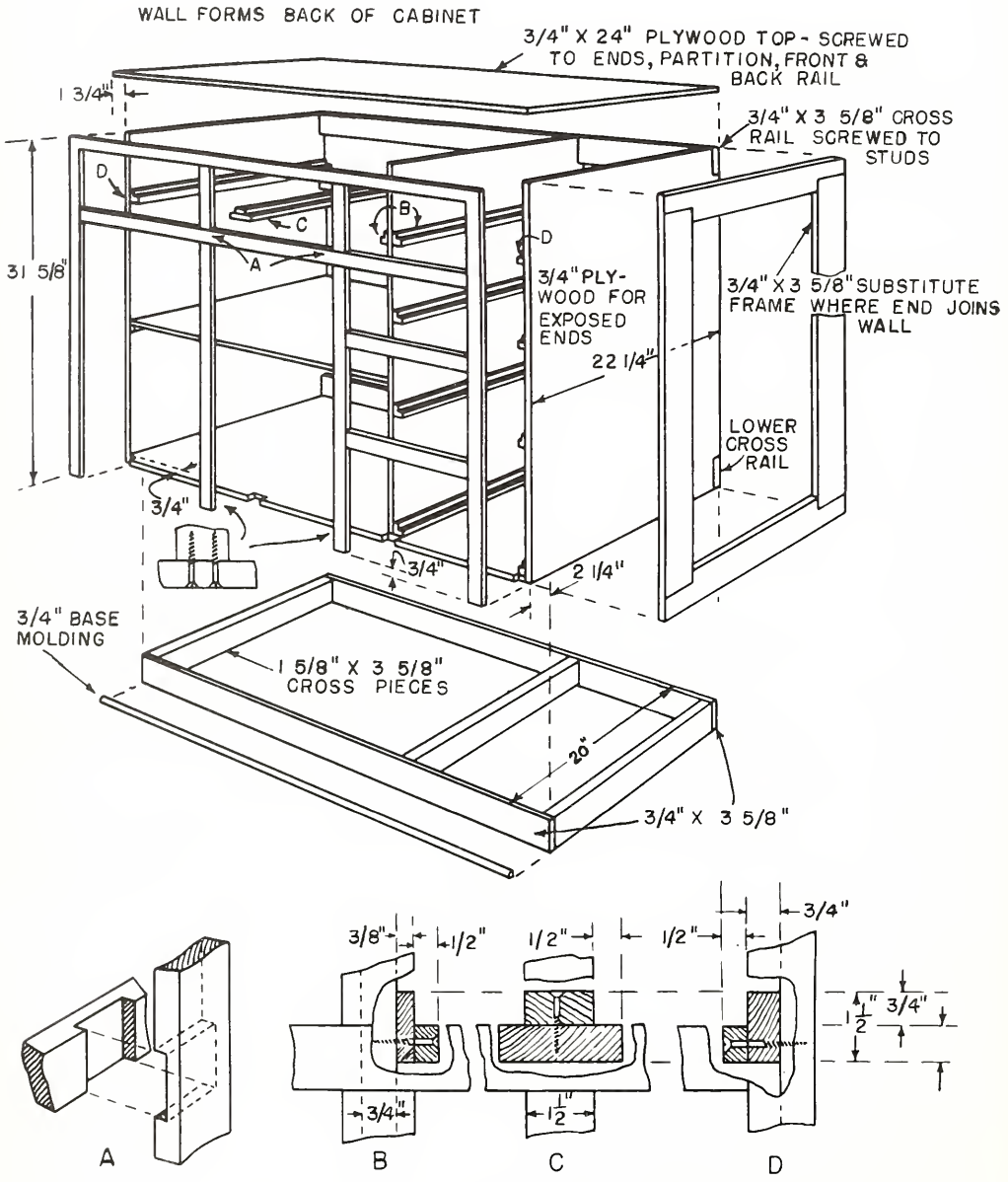



Figure **5–12** Base cabinet. *Courtesy of Skil Corporation.*

**Making base cabinets.** See Figure 5–12. Baseboards are removed for installing base cabinets. Toe space should be 4 inches high and 3 inches deep. If desired, the cabinet floor may be set into ⅛-inch grooves in the sides for added rigidity, the floor being glued and screwed through the sides.

Linoleum for counter tops is laid over felt, both being cemented with moisture-repellent cement. Figure 5–13 shows various types of linoleum edging in anodized aluminum, stainless steel, and plastics. For details of working with both plastics and linoleum, see pages 37 to 40.

Cabinet construction around sinks depends upon the type of sink. The one illustrated in Figure 5–14 is set into a linoleum- or plastic-covered plywood top resting on wood cabinets. The sink portion is available in single or double compartments. If you have an apron sink already in place, which you desire to keep, it is a simple job to build a base under it similar to the base illustrated here.

Corner base cabinets, Figure 5–15, are too large to pass through doors, and must therefore be assembled in the kitchen.

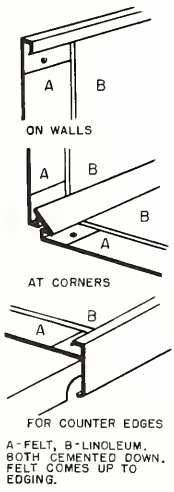



Figure **5–13** Various types of linoleum edging.

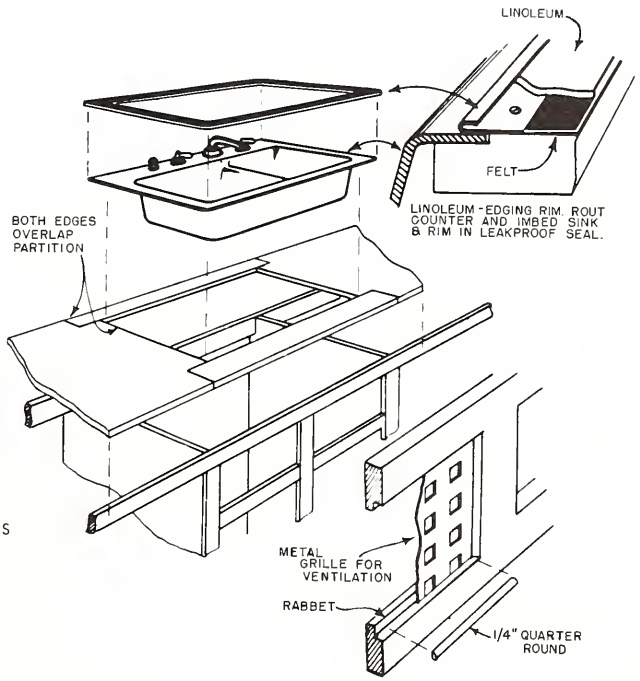



Figure **5–14** Sink-cabinet installation, showing sink set into a linoleum top.

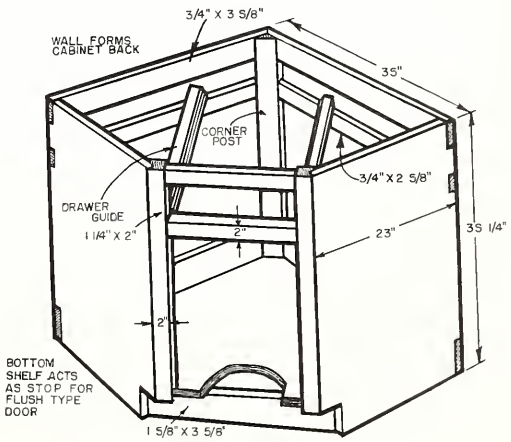



Figure **5–15** Corner base cabinet.

Note that the doorframe is similar in construction to that of the corner wall cabinet. Rotating shelf units, called Lazy Susans, Figure 5–16, are labor savers that can be used in new or already installed corner cabinets. Floor flanges, reamed out to slip over ¾-inch pipe, serve as bearings, and the weight is carried by a

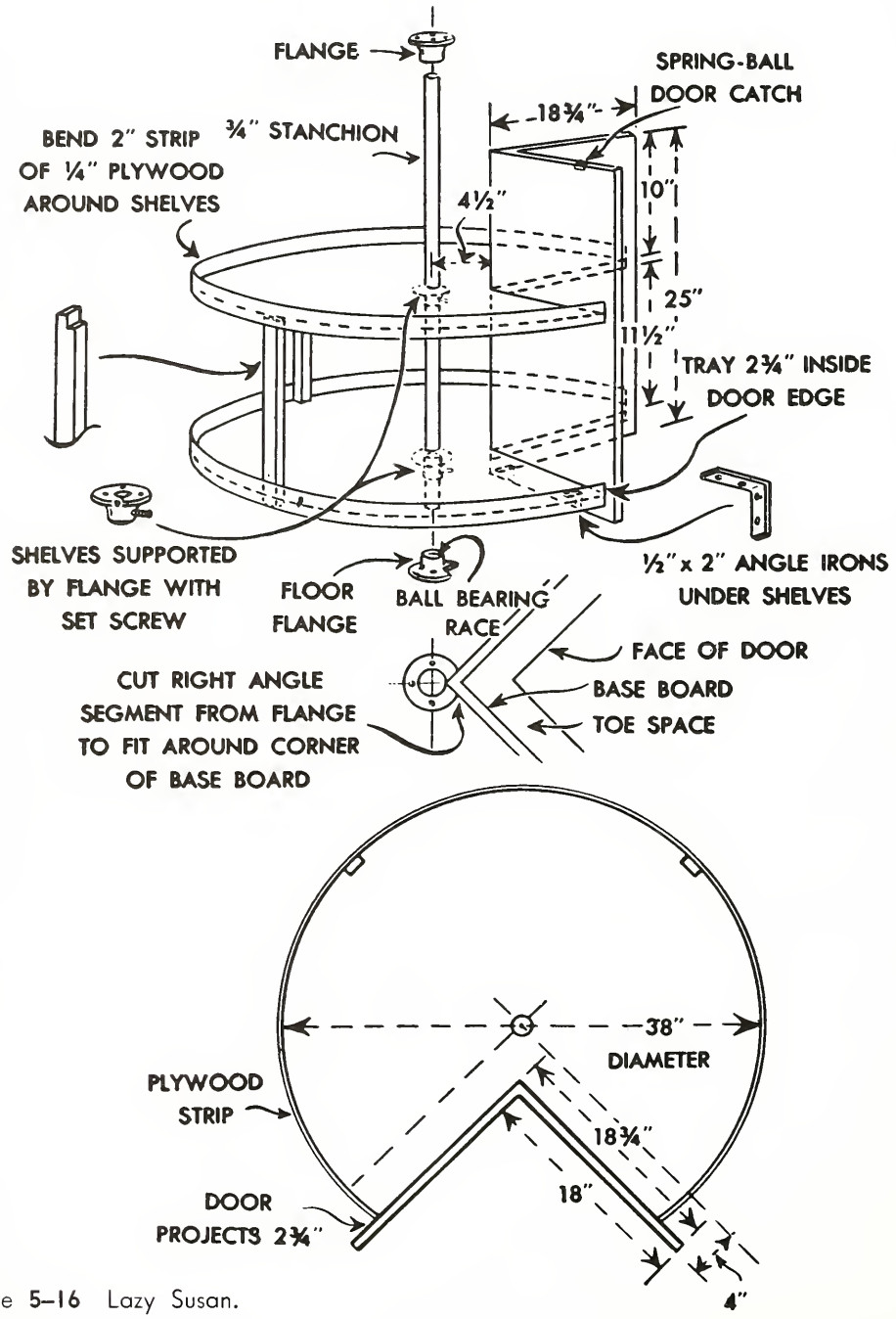



Figure 5–16 Lazy Susan.

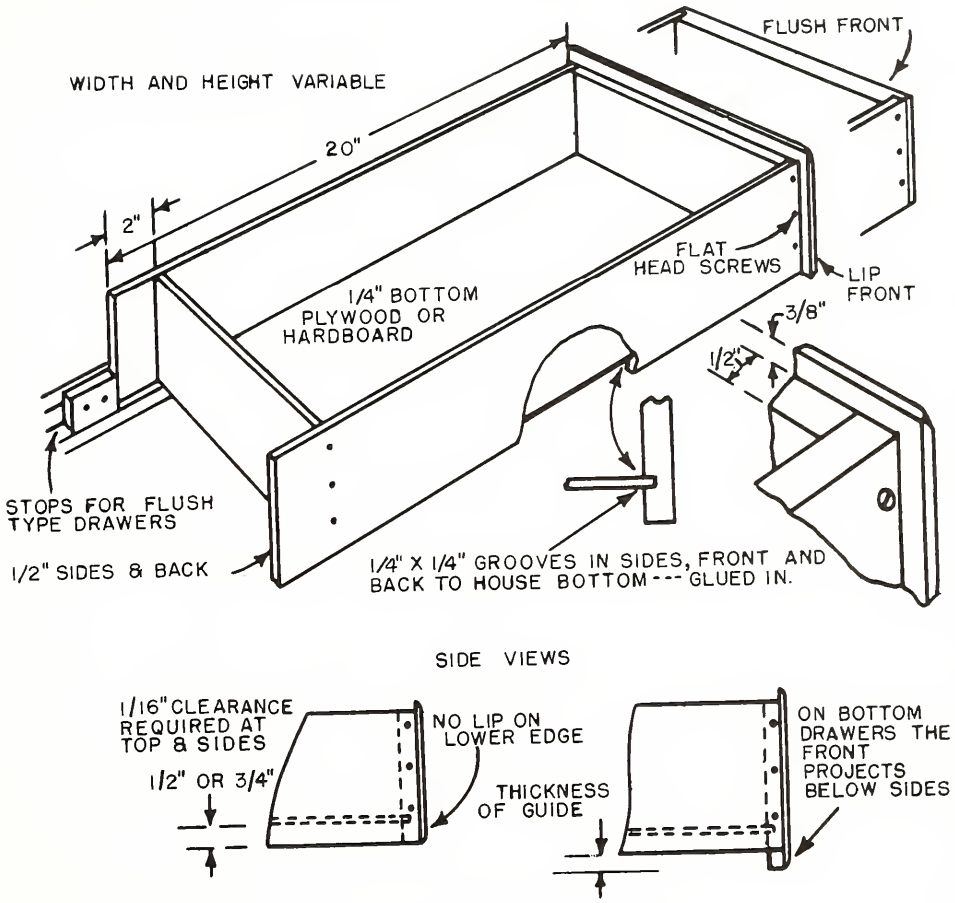



Figure **5–17** Drawer construction. *Courtesy of Skil Corporation.*

steel ball in the lower flange. Three or four braces between the shelves and a block under the cabinet floor are required.

Typical drawer construction for a base cabinet is shown in Figure 5–17. A clearance of 1/16 inch should be allowed at the top, bottom, and each side of a drawer to avoid binding in the frame and guides. If you want easy-action drawers at moderate extra cost, install rollers and tracks. A roller is recessed in each side of the drawer at the back; another roller is recessed in the front end of each guide. The guides must be of hardwood and at least 1½ inches thick. A metal track of ½-inch angle is screwed to each side of the drawer and to each guide. The rollers project slightly beyond the track surfaces to prevent the tracks from rubbing against each other. Fiber washers, arranged to rotate on screws, minimize friction against the hold-downs.

Utility cabinets usually extend as high as the top of wall cabinets. Figure 5–18 shows construction.

**Building a drop ceiling over cabinets.** A drop ceiling or soffet may be used to close waste space over wall cabinets, but it should be installed before the cabinets are attached to wall studs. The front

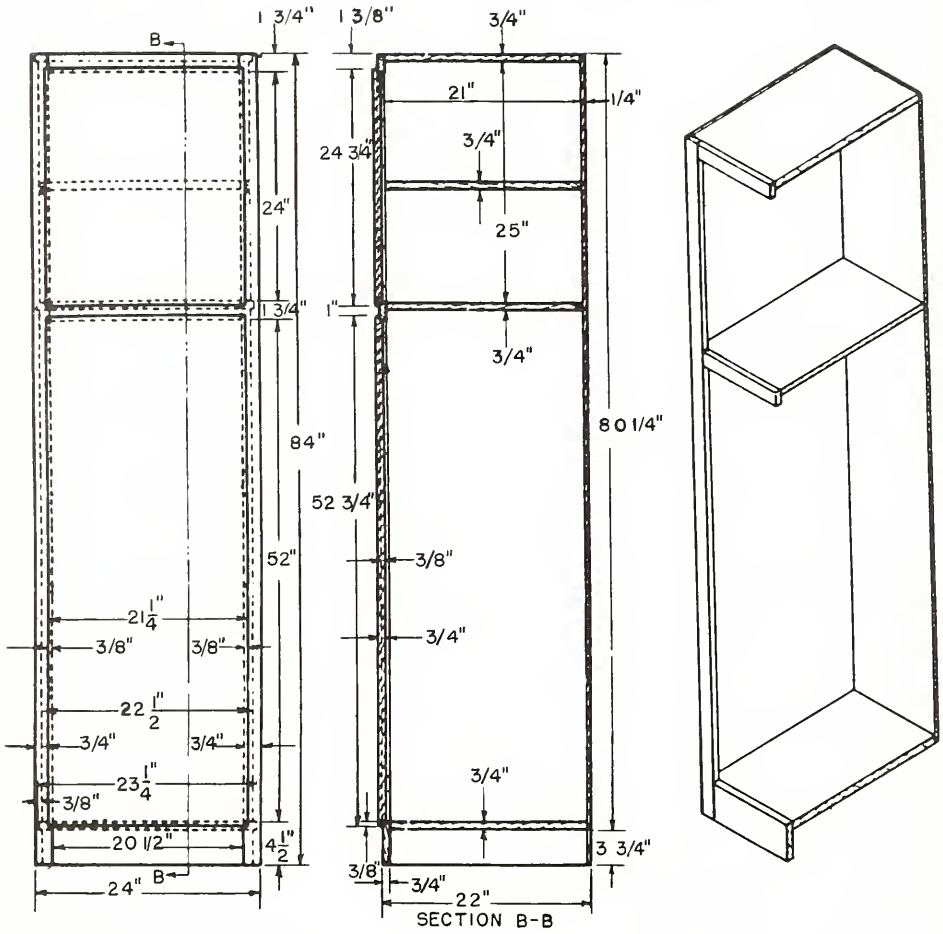



Figure **5–18** Utility cabinet.

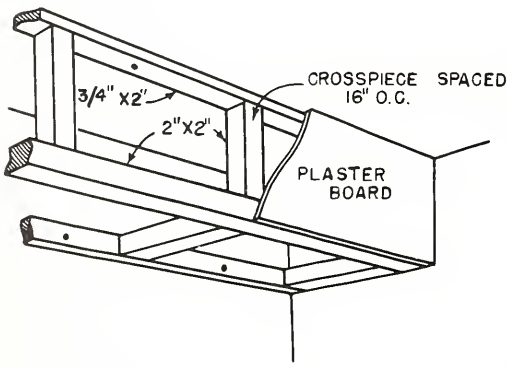



Figure **5–19** Building a drop ceiling. *Courtesy of Skil Corporation.*

and, if desired, the bottom may be covered with plasterboard, plaster, hardboard, plywood, or a piece of wood, not extending beyond the front edge of the wall cabinets. If plaster is used, it should be bonded to the ceiling plaster after some of the latter has been chiseled off alongside the joint to prevent a crack. Construction is shown in Figure 5–19.

**Rebuilding cabinet doors.** If you would like to put new life into an old kitchen without a complete remodeling, one of the best places to start is with the cup-

board doors. To have smart, modern-looking flush doors, just cover the old wood panels and frames with hardboard. (See Figure 5–20.)

Remove the old doors from the cabinets or cupboards, together with hinges and knobs. (Gains will be covered by new doors.) Place frames on hardboard, measure off ⅜-inch margin all around, and mark. If doors are to have hardboard backs, use edges of frame as pattern. Cut out hardboard on lines marked, using a fine-toothed saw, preferably a crosscut. Make cut on downstroke, keeping saw as nearly horizontal as possible. If held too high, saw tends to leave hardboard with rough or jagged edges and makes sanding more difficult.

Using fine sandpaper, lightly sand face of wood frame to remove grit and particles of old paint. Coat frame with a generous layer of linoleum cement or similar adhesive, using spreader for best results. Keep cement off edges of frame as much as possible. Press hardboard down firmly in cement and start brads 4 to 6 inches apart into hardboard. Position hardboard, carefully checking ⅜-inch measurement all around, drive home brads, and set. Fill nailhead dimples with wood putty and sand smooth. If hardboard back is to be applied to frame, follow same method as with face.

Test edge of hardboard with square, and true up with block plane or sandpaper. Round off outer or facing edge in the same manner. The rounded lip presents a neat appearance, cannot split, chip off, or snag hose. If you are applying a hardboard back, be sure edges are flush with old frame. In fitting doors to cabinets, allow a clearance of 1/16 inch or more, since lip covers cracks (and old gains) anyway. Semiconcealed or offset hinges require gains cut in back of door. After all doors have been refaced, they are ready for painting.

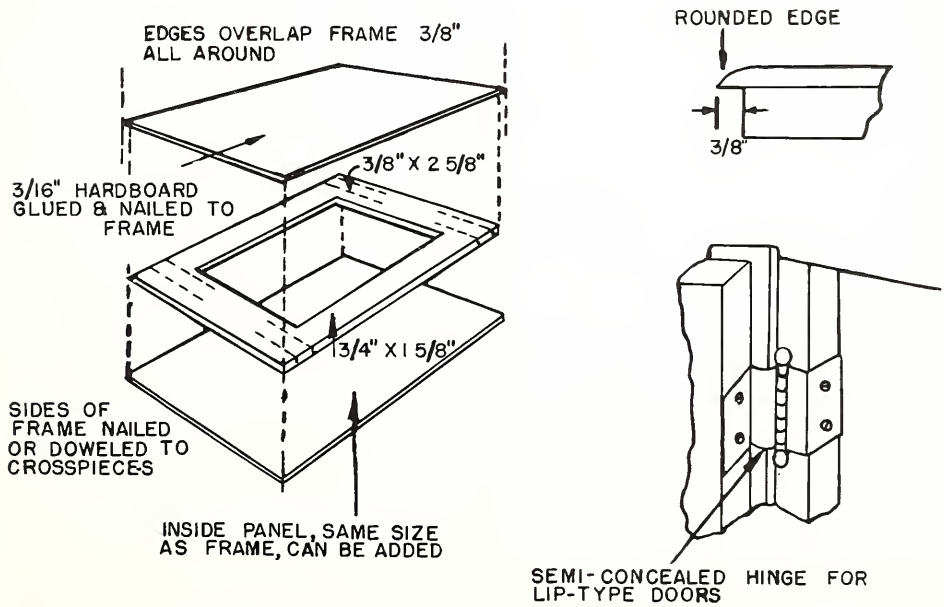



Figure **5–20** Remodeling old cupboard doors. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

## BUILT-IN EATING UNITS

**Foldaway dinette.** Many kitchens are too small for a breakfast nook. Figure 5–21 shows a space-saving dinette that can seat 4 for a meal, has plenty of room for dishes and appliances, yet folds into a wall cabinet when not in use.

Mark off on side panels B and C location of shelves, showing both top and bottom lines of shelves. Since the stock is ¾ inch thick, the guide lines will be ¾ inch apart. This gives an accurate guide when nailing, to prevent missing the center of the shelf board and exposing a nail end.

The spacing of the shelves is not given on the plans; you can space them to fit the articles you wish to put in them. It is suggested that the shelf adjacent to the table should be high enough to accommodate a waffle iron, electric toaster, or other articles needed at hand during the meal.

Install shelf supports P to Z, F-1, and H-1 on side panels B and C. Be sure to locate them on the lower shelf line. Use 3*d* finishing nails and glue to secure them to the panels. Nail from the inside. Then cut out recess at base of side panels B and C for kick board I. Be sure to put these recesses at the bottom of the panels at the front.

Nail and glue top and bottom pieces A and O to sides B and C. Use three 6*d* finishing nails at each joint, evenly spaced, and set head slightly with a punch. Then position shelves K, L, M, and N and nail and glue them in place.

Lay frame flat and tack back panel J-1 in place. Be sure frame and back panel are square; if frame is sprung





Figure **5–21** Photographs of foldaway dinette, open and closed. *Reprinted from* Home Maintenance & Improvement.

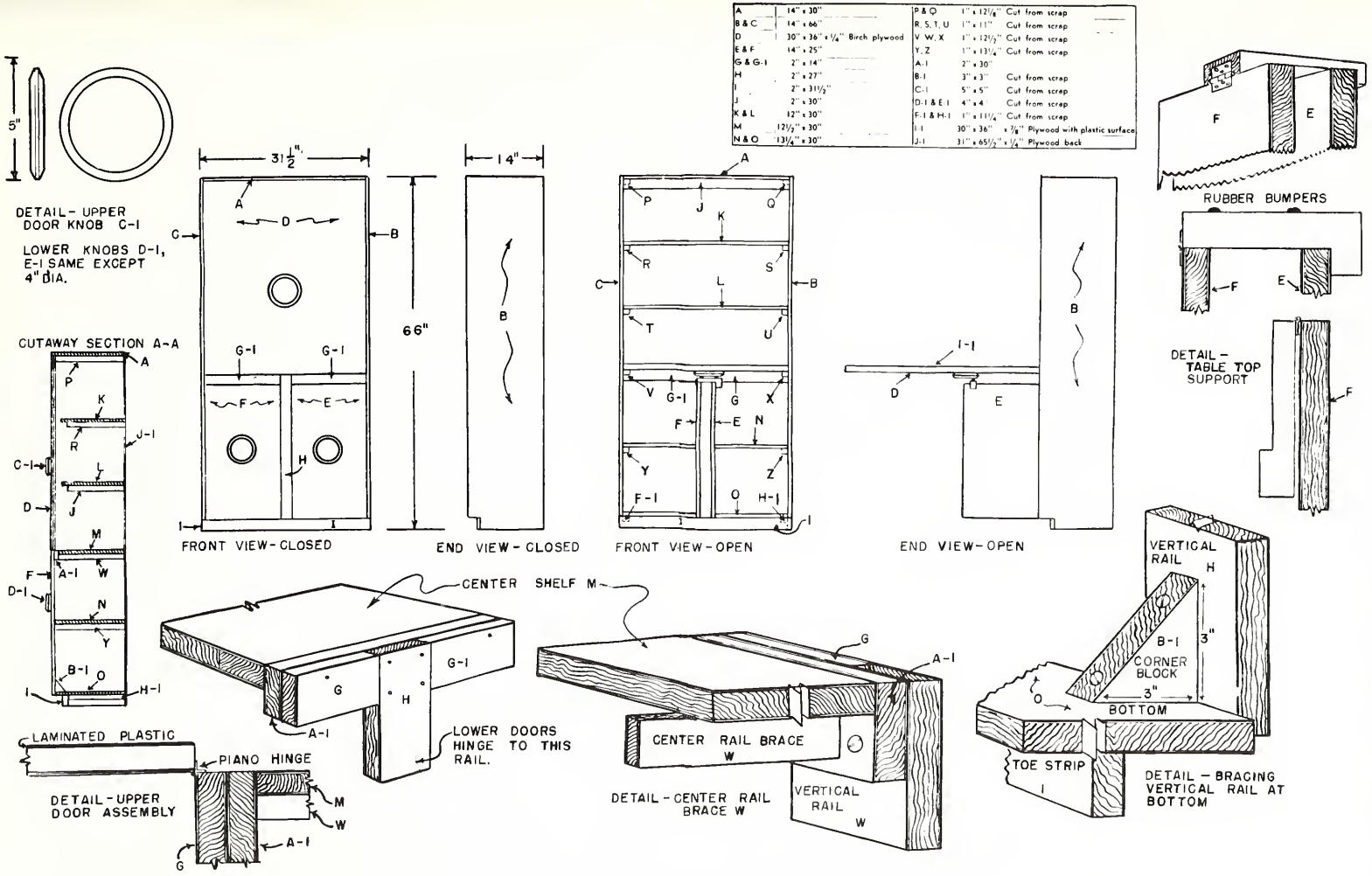



Figure **5–21** (*continued*) Diagram of foldaway dinette. *Reprinted from* Home Maintenance & Improvement.

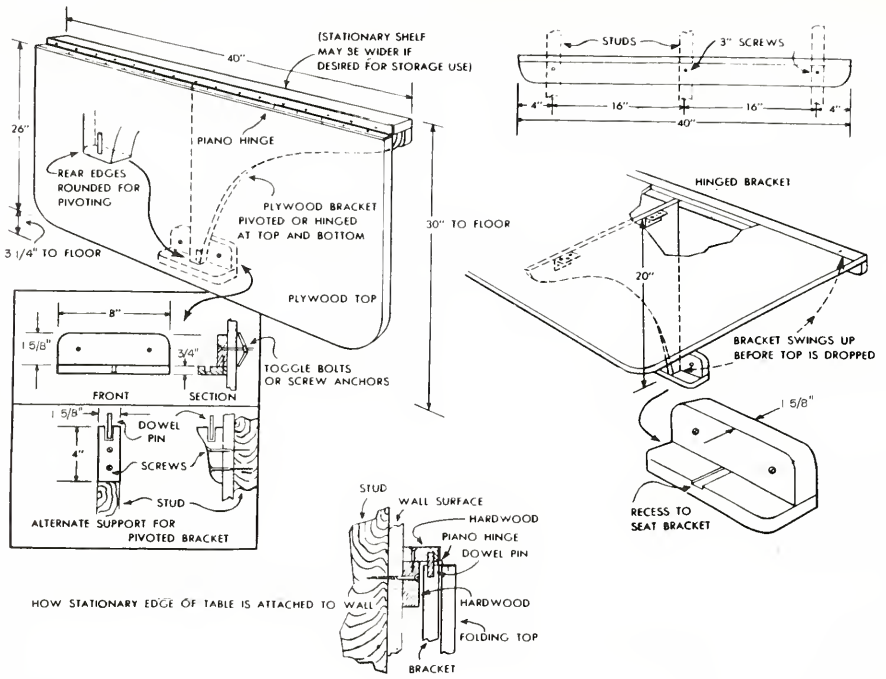



Figure **5–22** Fold-down table. *Reprinted from* Popular Home—*United States Gypsum Company.*

slightly, draw it back into square and, as you nail on back panel, hold frame firm and true. Turn cabinet over and nail on kick board I. Then install door rails and supports H, G, G-1, and J.

Assemble upper or table-top door I-1, tacking and gluing on a ¼-inch-plywood face D to the outside. Sand edges smooth, locate piano hinge, and install knob. Then install table-top door to frame. Hang lower doors E and F from cabinet rail H, using 3-inch brass butt hinges with ¾-inch leaves. Mortise leaves into edge of doors and rail H. Make the table-top support next and hinge it to door F. This swings over and locks lower doors together in the open position to support the table top.

When you set the cabinet in position in the kitchen, you will note that it is topheavy. This cannot be avoided without destroying its space-saving features. However, you can secure it rigidly to the wall by screwing an eyelet into the top of the cabinet at the back and driving a long screw through the eyelet and the wall into a framing stud. Before driving the screw, check to see if you are over a stud by driving in a small finishing nail; if you are not over the stud, the small nail hole can be easily patched with a bit of putty.

You can finish the dinette in any way you wish—painted, natural, or natural on the outside and painted on the inside.

**Fold-down table.** A fold-down table (Figure 5–22) is a fine built-in for a small or large kitchen. Dimensions may vary from those given here.

Attach the stationary edge to wall studs with 3-inch flathead wood screws. Drill

screw body-holes in strip and countersink for screwheads. If studs are located near one end and center of strip only, use a toggle bolt or Molly through wall surface at other end.

The plywood bracket that supports the table top may be pivoted or hinged to swing against the wall, or it may be hinged to the table top to fold up against it. In the latter case, the vertical edge of the bracket must line up with the edge of the top to fit under the stationary strip and the lower support, for the bracket comes out farther from the wall to keep the top horizontal when opened. Tack on rubber bumpers to cushion table-top doorknob that rests on support when table is open.

## OTHER KITCHEN CONVENIENCES

Whether you are remodeling your entire kitchen or just a part of it, you can make the kitchen more efficient with some or all of the ideas and conveniences shown and described in Figures 5–23 through 5–36. Although not all of these may fit into your kitchen in the sizes specified, you may vary them or combine them as you choose to suit your requirements.

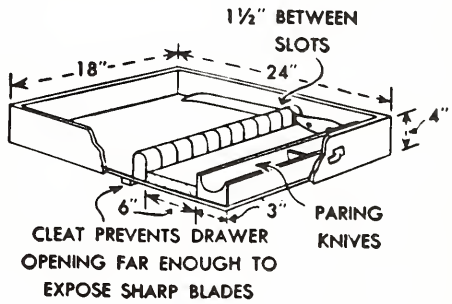



Figure **5–23** Knife drawer which holds knives sharp edge up, protecting the edges. The drawer opens only far enough to reach the handles, so that the blades are covered for safety. *Courtesy of Malarkey Plywood.*

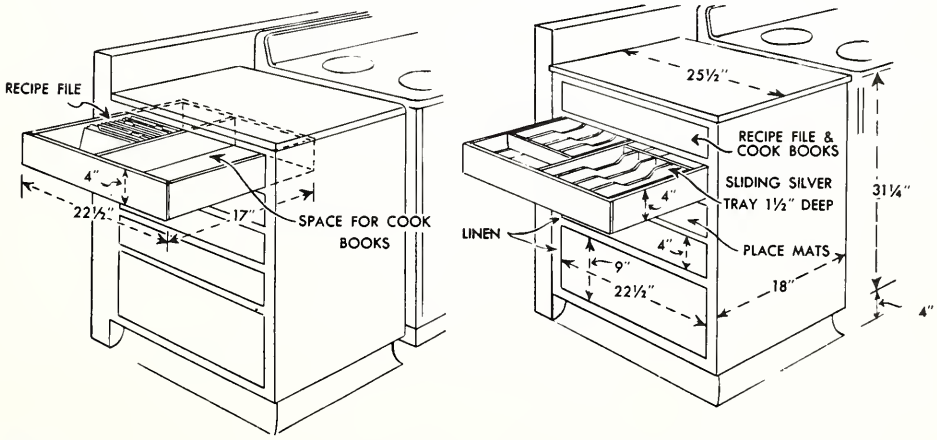



Figure **5–24** Cabinet with a recipe file, *left*, which keeps your favorite recipes and cookbooks in order. The other drawers of the cabinet, *right*, can be used for the storage of linen and silver. *Courtesy of Malarkey Plywood.*

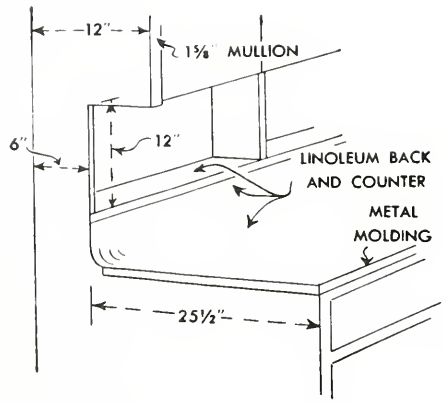



Figure **5–25** Recessed shelves beneath cupboards, which provide excellent space for most frequently used dishes, paper towel roll, kitchen radio, etc. *Courtesy of Malarkey Plywood.*

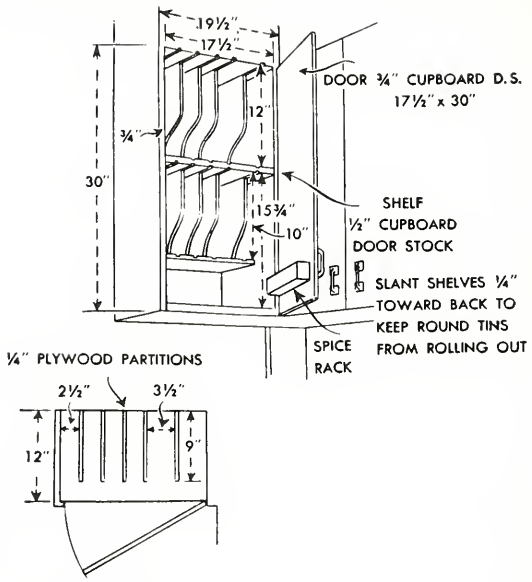



Figure **5–26** Lid and pan rack that may be put in any standard wall cabinet. Lids and flat pans such as cooky sheets and pie pans stand up in this handy, space-saving rack and are right at hand when you want them. *Courtesy of Malarkey Plywood.*

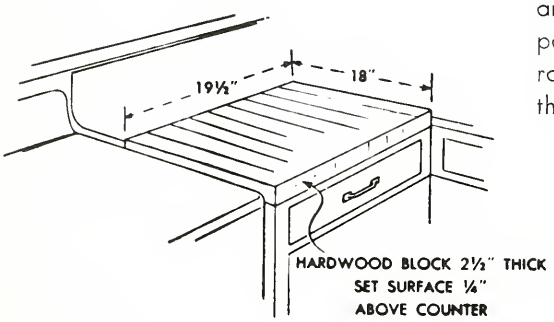



Figure **5–27** Chopping block $2\frac{1}{2}$ inches thick, a hard surface for chopping or pounding, handy to the range. It is made of hardwood blocks glued together. *Courtesy of Malarkey Plywood.*

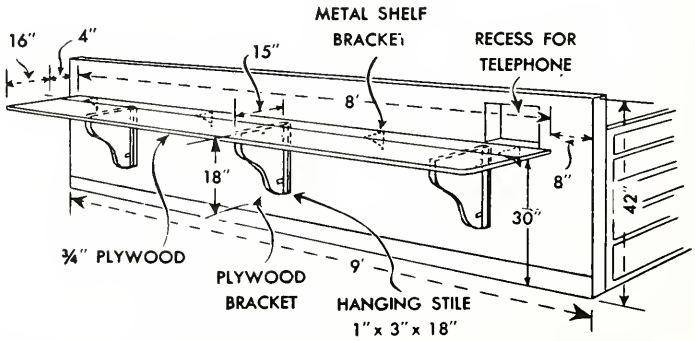



Figure **5–28** Snack shelf, convenient for serving quick meals and jotting down recipes or grocery lists. It drops down when not in use.

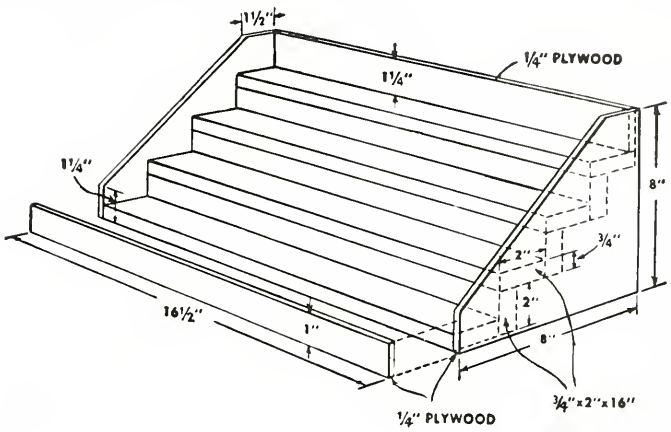



Figure **5–29** Condiment rack, an adjustable step shelf, desirable for use at the preparation or cooking center. When placed on the lower shelf of a wall cabinet this unit makes an easily visible and conveniently accessible rack for condiments and flavoring.

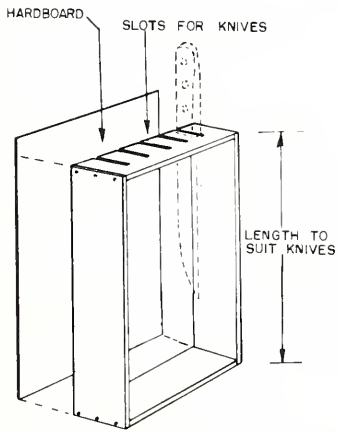



Figure **5–30** Knife box with a bottom that prevents bumping or brushing against the points. It can be attached to the inside of a cabinet door or on a wall. The front is open for easy cleaning.

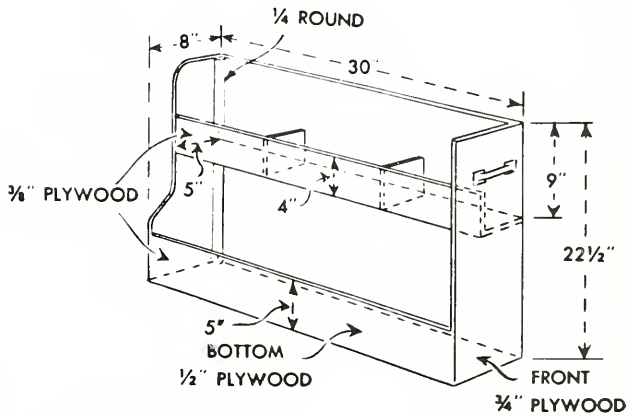



Figure **5–31** Sliding soap and cleanser rack. *Courtesy of Malarkey Plywood.*

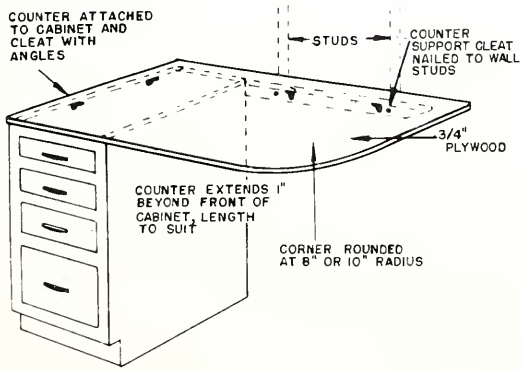



Figure **5–32** Corner desk, a desirable feature in any kitchen, made by adding a top to a regular base cabinet. The top should be about twice as wide as the cabinet, with one corner rounded, and may be covered with laminated plastic or linoleum.

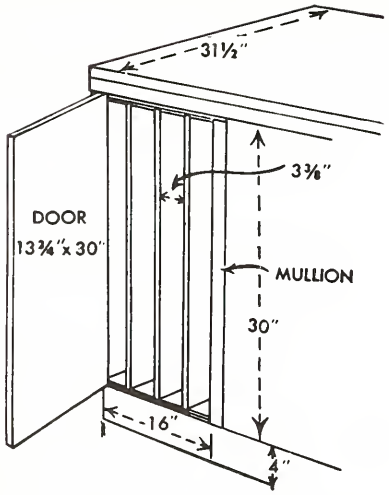



Figure **5–33** Tray rack, a convenient stand-up rack that holds trays neatly on end. It takes little space and makes it easy for you to select the trays you want and put them away after use. *Courtesy of Malarkey Plywood.*

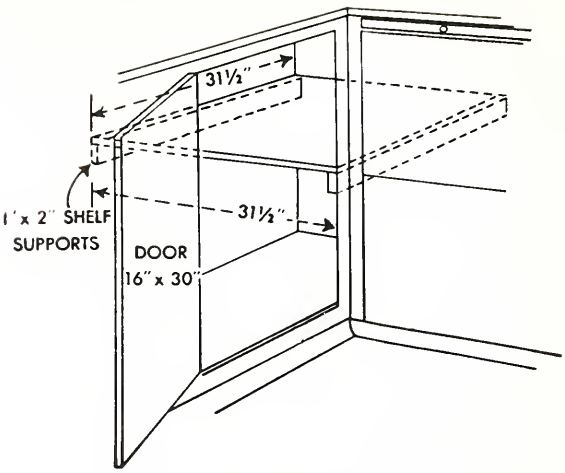



Figure **5–34** Oversize storage shelf, utilizing the entire corner space for large and seldom used utensils. *Courtesy of Malarkey Plywood.*

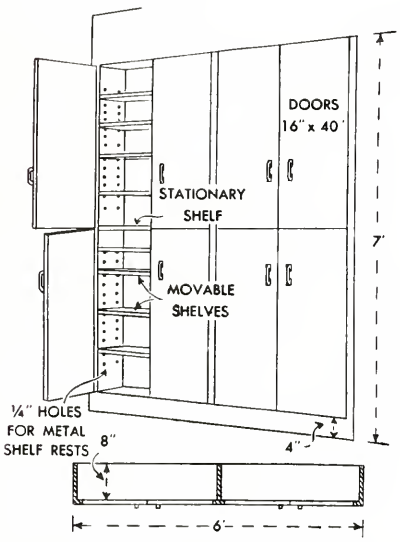



Figure **5–35** Canned-food storage wall, a shallow cabinet built in the same manner as wall cabinets (page 79). Shallow, adjustable shelves keep everything within easy reach. *Courtesy of Malarkey Plywood.*

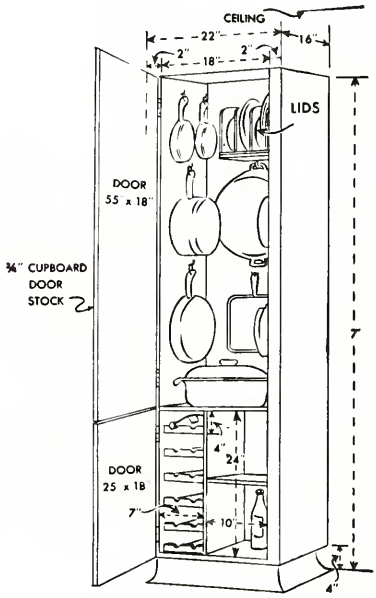



Figure **5–36** Stand-up utensil cabinet, a convenient place for heavier kitchen equipment. Roaster, Dutch oven, canning equipment, etc., are at the level where they are easiest to lift. The compartment at the bottom is useful for storage of bottles. The cabinet is constructed in the same manner as in Figure 5–18. *Courtesy of Malarkey Plywood.*

# LAUNDRY

The steadily growing use of automatic laundry equipment has changed concepts of laundry planning. The laundry takes little space, and as no water or wet clothes are handled, it is possible to make dual use of the room—for example, as a laundry-sewing room or combined with breakfast room, playroom, or home-freezing room.

The basic units are the clothes washer and clothes drier.

A sorting table or cabinet with sink bowl is desirable. A sink unit like that shown in Figure 5–14 is very good for this purpose. An overhead cabinet, of the same type as the wall cabinets for the kitchen, can be placed over the equipment.

An ironing board, either built-in or portable, should be provided; and if an ironer is not provided initially, space should be provided for it in planning.

Laundry planning, like kitchen planning, should save steps by establishing work centers and placing them in proper order. Home economists have agreed on the following sequence: (1) sorting and preparation; (2) washing; (3) drying; and (4) finishing.

**Built-in ironing board.** The sides, top, and bottom of the ironing-board closet shown in Figure 5–37 are made of ¾-inch plywood. Construction is completed in the same manner as with the utility cabinet (Figure 5–18).

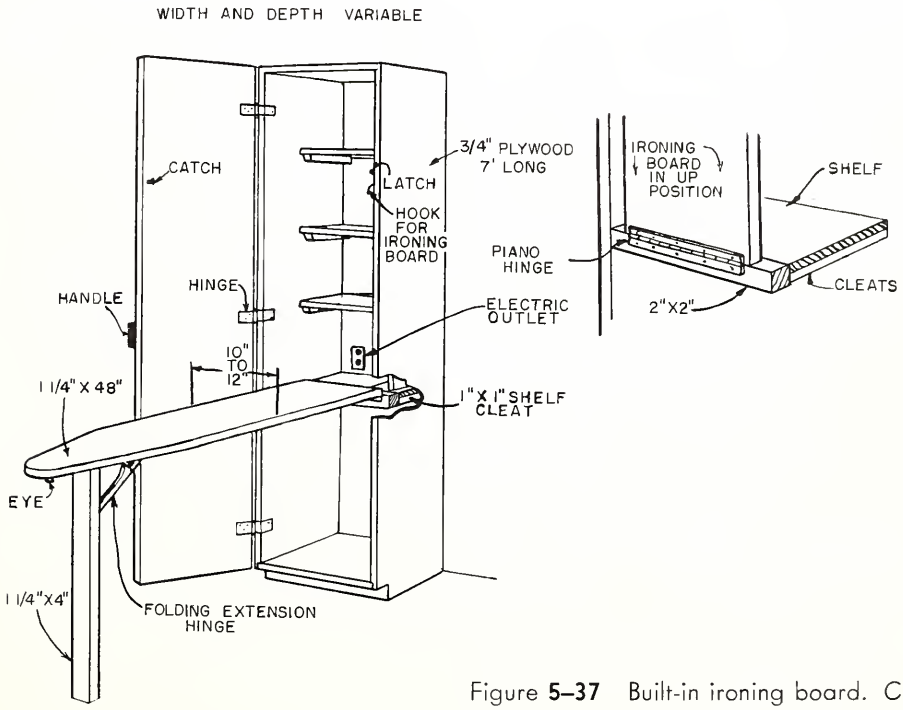



Figure **5–37** Built-in ironing board. *Courtesy of Douglas Fir Plywood Association.*

**Movable ironing board.** If a built-in ironing board is not desired, an ironing board can be supported upon the drawer and ledge of a base cabinet as shown in Figure 5–38, by prongs in the end of the ironing board. Ironing-board prongs are readily available in hardware stores.

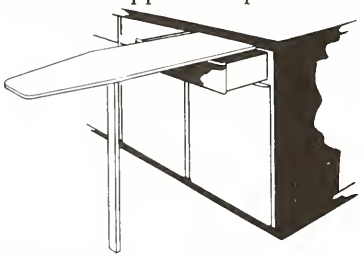


Figure **5–38** Ironing-board support unit.

**Laundry cabinet.** You can build a handy laundry cabinet (Figure 5–39) inexpensively by using ⅛-inch hardboard nailed on frame pieces to form panels which are nailed or screwed together. The front is raised to provide an extension leaf, which is supported by a 2-piece, hinged brace.

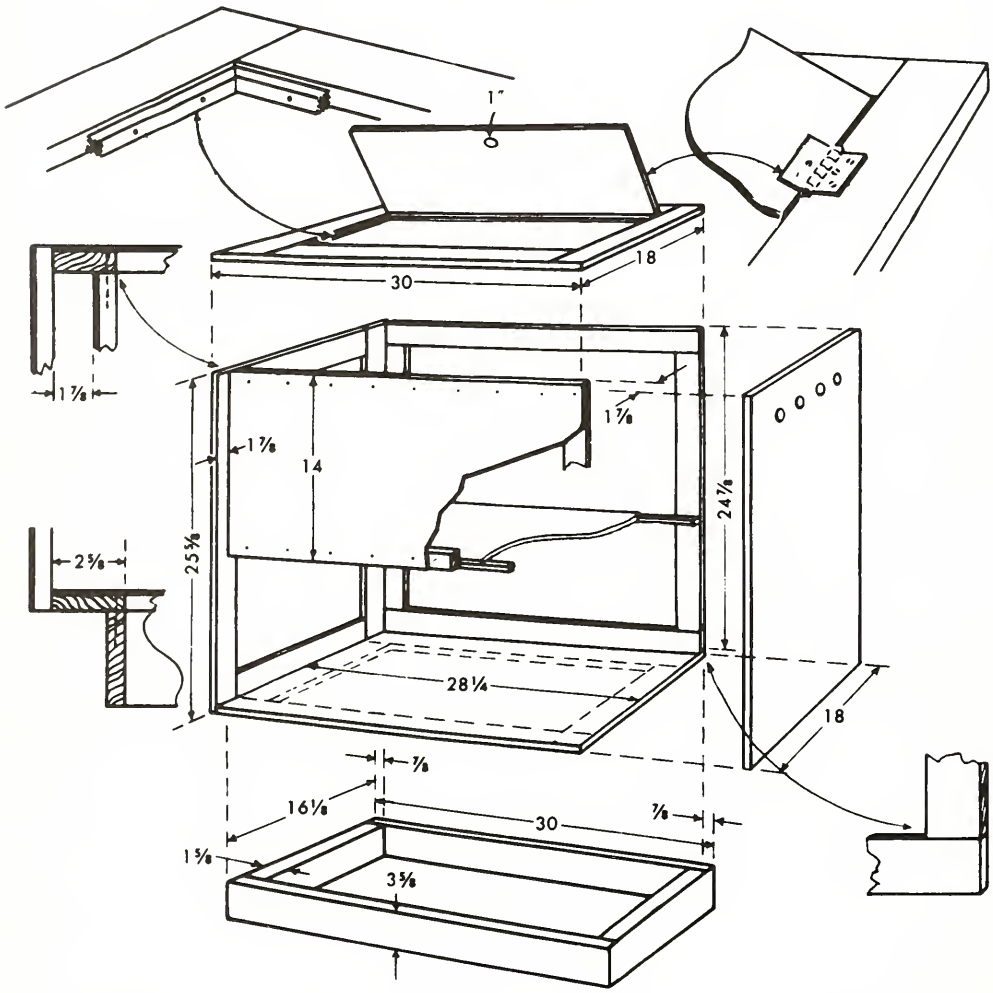



Figure **5–39** Laundry cabinet. *Reprinted from* Popular Home*—United States Gypsum Company.*

The brace automatically folds inside the cabinet when the leaf is dropped.

First make the base. Ends are thicker than front and back members, to support sides. Next make bottom, sides, and back. All frame pieces are 2⅝ inches wide except those for back and partition, which are 1⅝ inches wide. Butt frame pieces

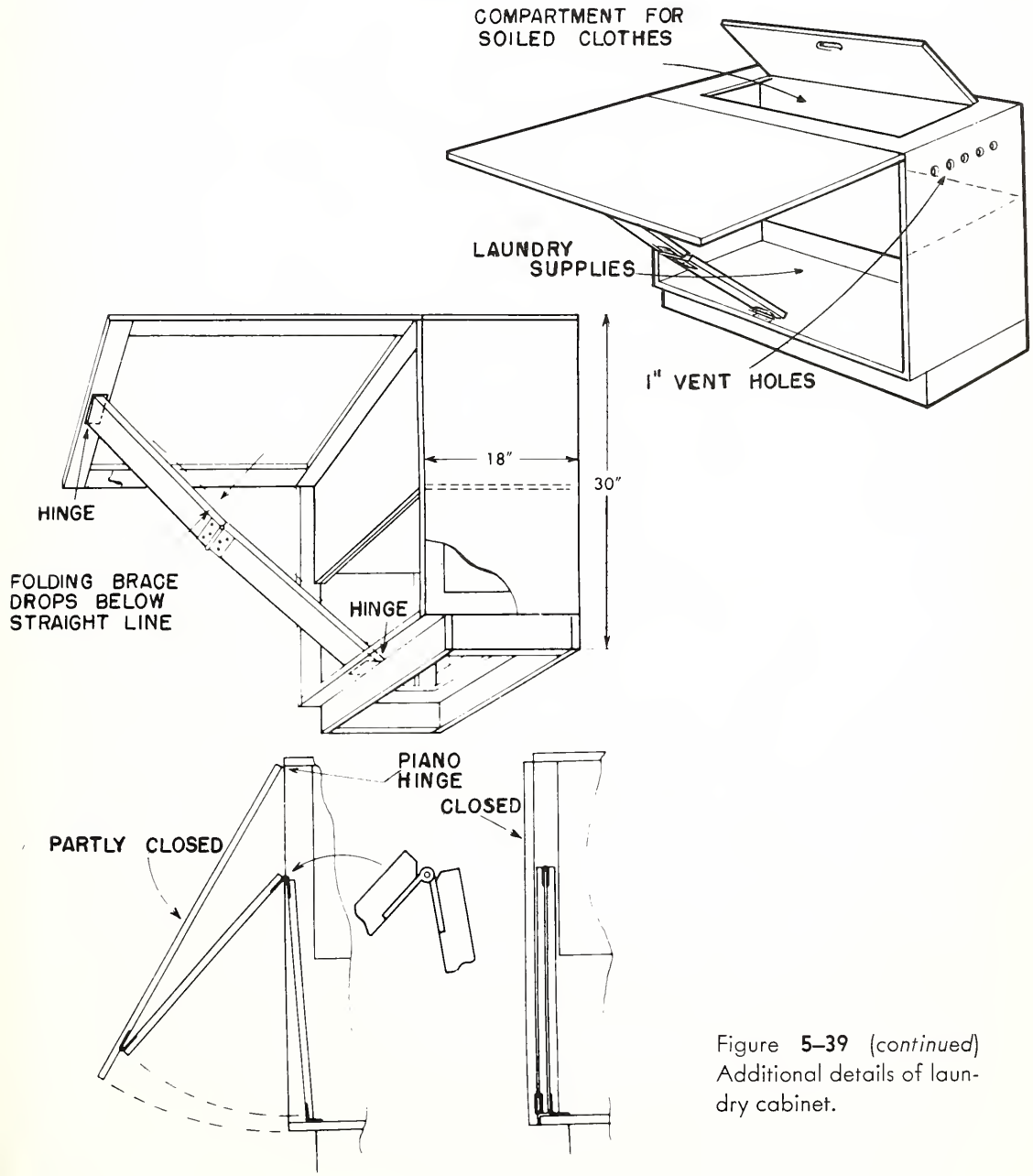



Figure **5–39** (*continued*) Additional details of laundry cabinet.

together and nail them with 10*d* finishing nails, sunk in with a nail set. Nail bottom to base so that front edge extends for toe space. Bottom covering does not come to rear edge, but leaves a ⅞-inch strip of frame exposed on which back is nailed. Nail or screw side panels to edges of bottom and back, install partition and shelf, then top.

Folding brace is housed in space in front of partition. Piano hinge attaching front or leaf to top is set down ⅛ inch below top so that leaf, when raised, is flush. The 2 members of the hardwood brace must be the same length exactly; hinges are installed flush. Assemble carefully so that when brace is extended center hinge drops slightly below the straight line and must be raised past center before brace will fold.

When the cabinet is completed, fill cracks and nail holes with wood putty, sand smooth when dry, then paint, using 2 coats over a glue size.

# CHAPTER 6

## BEDROOM IMPROVEMENTS

A THIRD of your life is spent in your bedroom, and your first impressions on arising and your last on retiring come from your surroundings. Not only do you sleep there; you dress and undress, read, relax, sew, write letters, work at your hobbies, and may, in case of illness, spend your whole time there. It is the most personal room in your house; therefore, its furnishings and improvements, more than those in any other room, should be harmonious with your personality. No other room in the home can be treated so individually.

**Planning the bedroom.** In planning the bedroom, keep in mind its 4 uses: sleeping, dressing, clothes storage, and leisure. If space is limited, center the leisure or work activities elsewhere in the house rather than cramp the sleeping, dressing, and storage space.

The problem of built-in furniture for the bedroom should be approached as methodically as for the living room or kitchen. By making an inventory of the articles kept and used in your bedroom, you will be able to make more useful built-ins than by going about the job haphazardly.

**Built-in bed.** A built-in bed with storage drawers underneath (Figure 6–1) is ideal for your bedroom. All dimensions given are for standard twin-bed springs, but by changing the 39-inch width to 54 inches, double-bed springs can be used. However, it is best to check these dimensions against the actual spring and mattress you expect to use. The springs rest on cleats screwed to the side boards. If the springs require more support, use cross slats resting on this ledge, or block the springs up from the floor to the proper height.

**Headboards.** Figure 6–2 shows the details for building a storage headboard for a double bed. Nail base pieces together and attach bottom. Then notch front at lower corners and attach to base and bottom. Next install partitions and back. Cut out lid from top. Avoid nailing top to sides and partitions; instead, use corner brackets screwed on inside. Crosspieces over doors come under extending top and are nailed to vertical strips to which doors are later hinged. Front and bottom serve as doorstops. Allow 1/16-inch clearance between door and top strip. If wall baseboard is higher than 5⅝ inches, use wider stock for base, allowing cabinet to fit more snugly against wall.

Figure 6–3 is a headboard designed to stand behind a Hollywood bed, giving it a built-in look. This design, with its sliding doors, gives backing for the upper edge of the mattress and the pillows so they cannot push back into the headboard, and at the same time gives hidden storage space for an extra pillow, spare blankets,

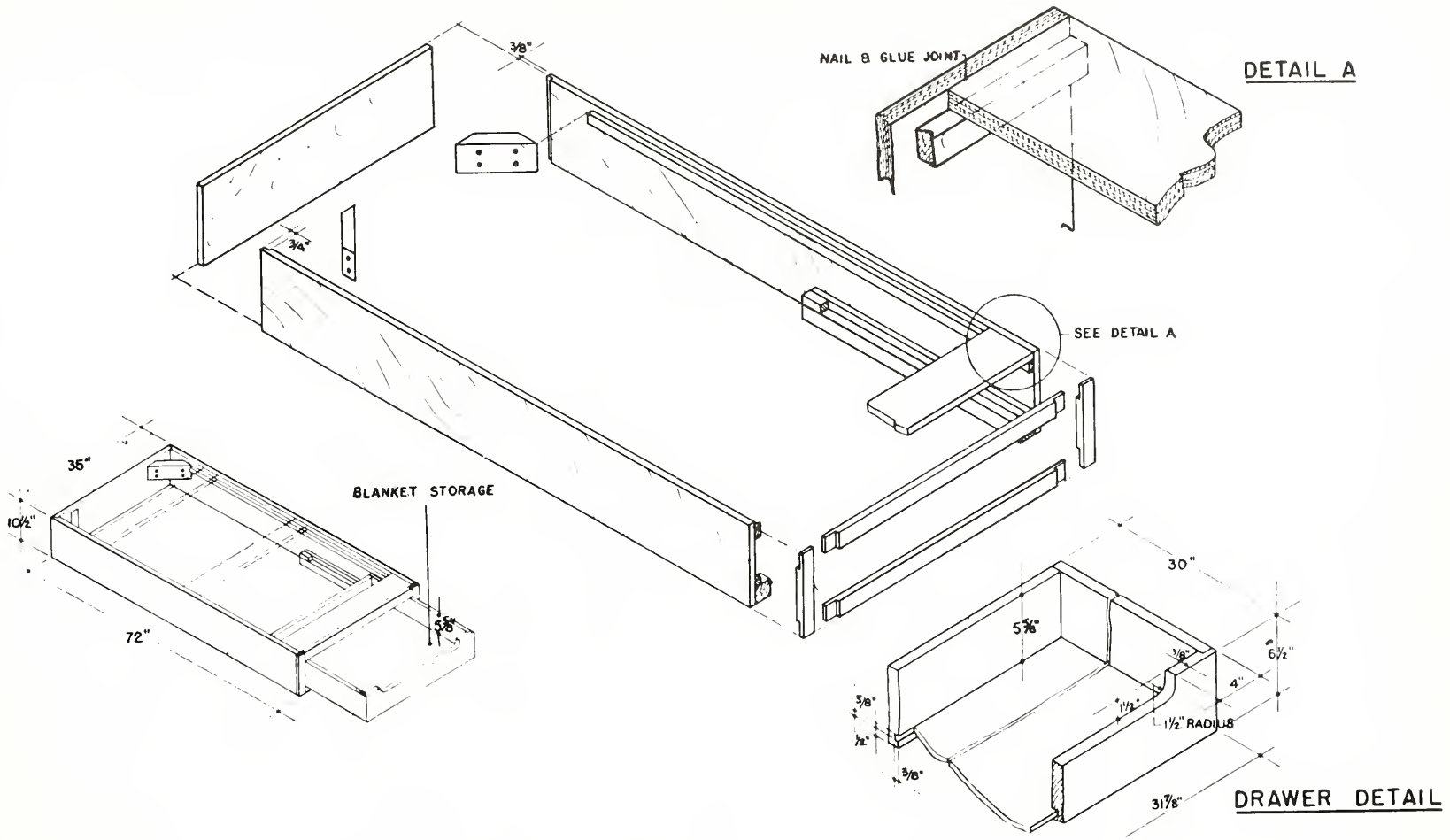



Figure 6–1 Built-in bed with storage drawer. *Courtesy of Malarkey Plywood.*

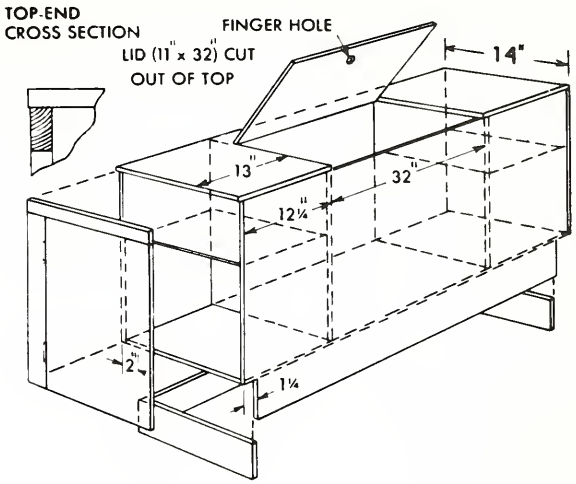
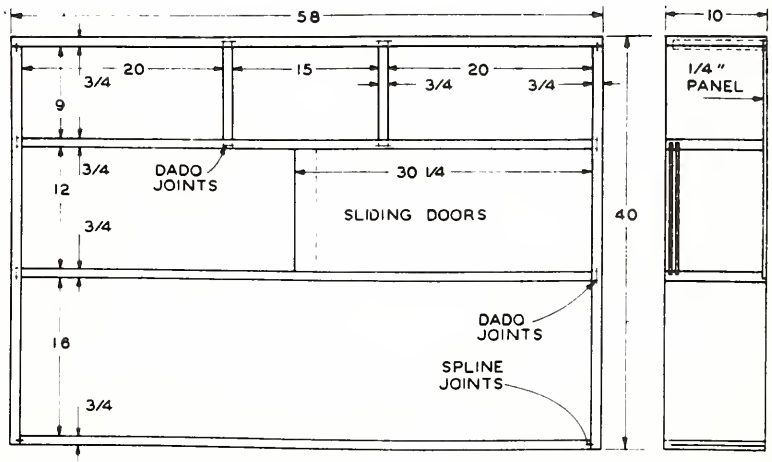
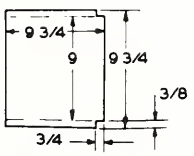
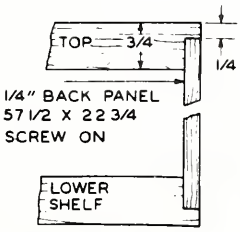


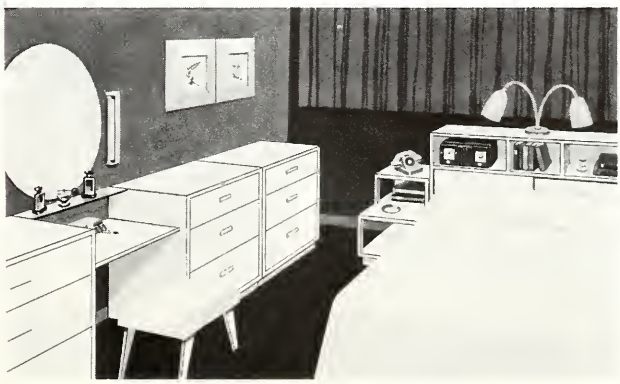

Figure **6–2** Storage headboard. *Reprinted from* Popular Home—*United States Gypsum Company.*

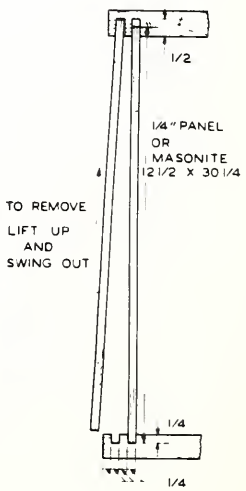
Figure **6–3** (*Below*) Headboard for a Hollywood bed. *Courtesy of Skil Corporation.*





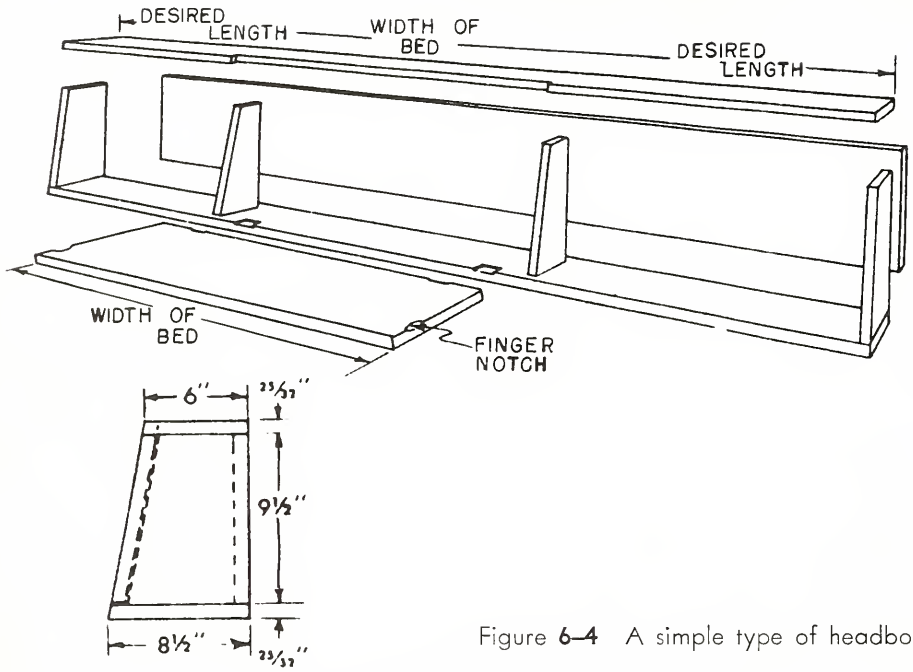



Figure 6–4 A simple type of headboard.

etc. For easier cleaning, the doors can be made removable by making the upper grooves deeper than the lower ones and slightly wider. For doors, ⅛-inch hardboard or ¼-inch plywood is used.

Another design for a headboard is shown in Figure 6–4.

**Night stands.** The stand shown in Figure 6–5 is equally useful as a night stand in the bedroom or as an end table in the living room. Cut the 4 large parts (back, top, center shelf, and bottom) as indicated in the diagram. Then make the 4 vertical pieces to support the front of the center and top shelves.

Another design for a night stand is shown in Figure 6–6. The convenient shelf-and-door compartment is a handy place to keep telephone, magazines, small radio, etc. The night stand can be joined with a headboard or bookshelves.

**Chests of drawers.** Figure 6–7 gives the basic dimensions for the standard 3-drawer unit. First cut all pieces to size and follow the construction details given for the drawers. With finished drawers as guides, cut and assemble frame as shown. Base should be screwed to frame from below. You may make dado grooves in sides, bottom, and top to hold plywood back panel flush, or you may simply screw the back panel to the frame.

Figure 6–8 shows the construction of sloping drawer fronts which provide handholds, eliminating the conventional pulls.

The basic 3-drawer chest and a 2-drawer variation of it make possible many different arrangements as suggested in Figure 6–9. One of the most popular variations is a combination of units to make a simple vanity table, as described below.

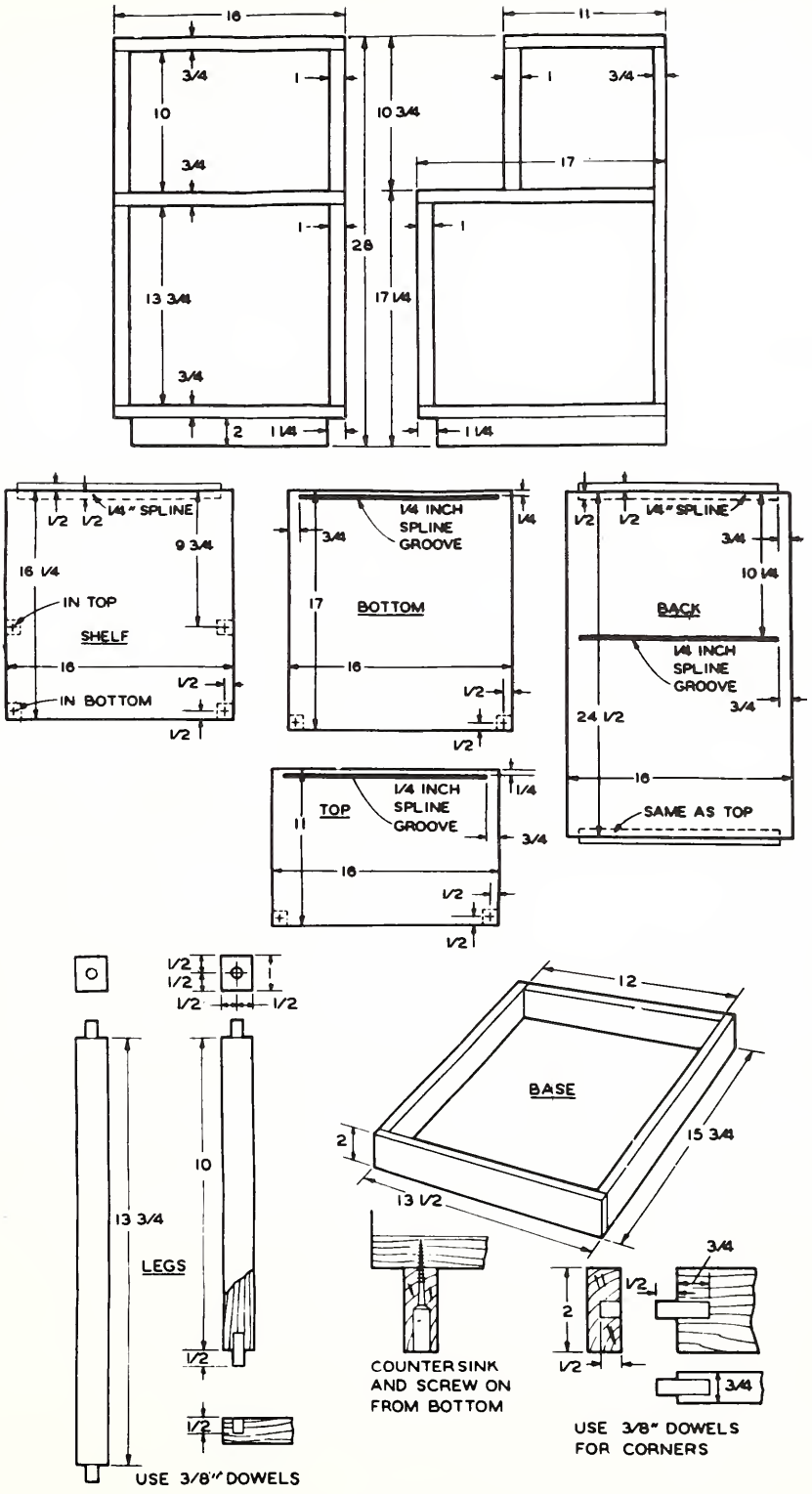



Figure **6–5** Night stand. *Courtesy of Skil Corporation.*

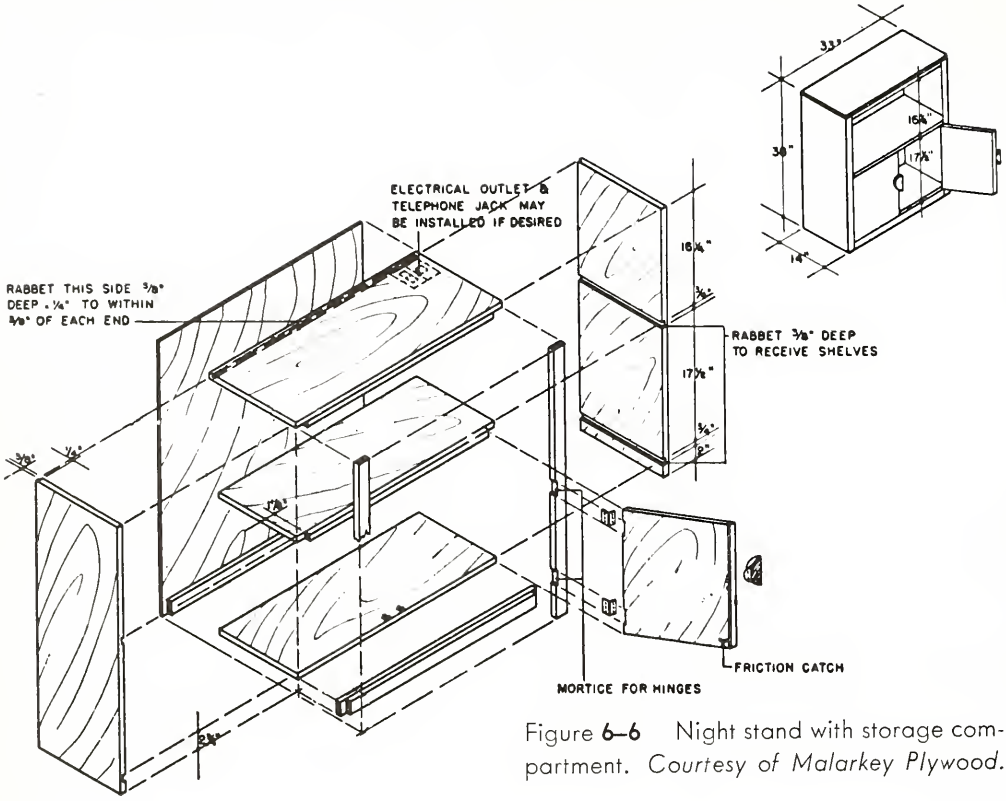



Figure **6–6** Night stand with storage compartment. *Courtesy of Malarkey Plywood.*

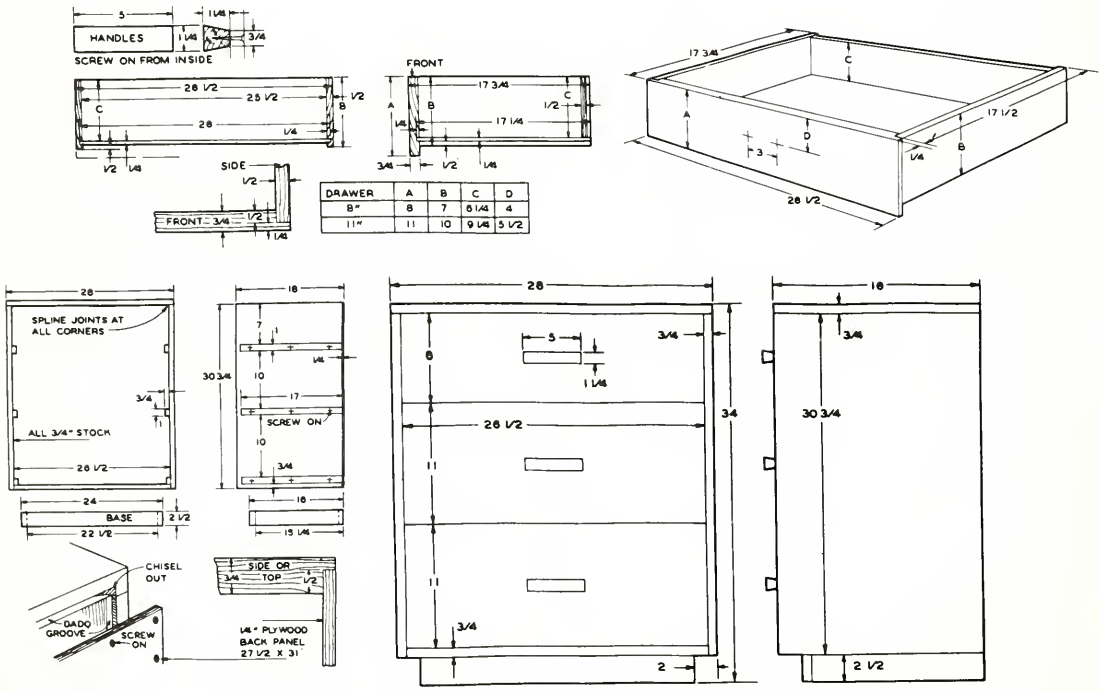



Figure **6–7** Standard chest. *Courtesy of Skil Corporation.*

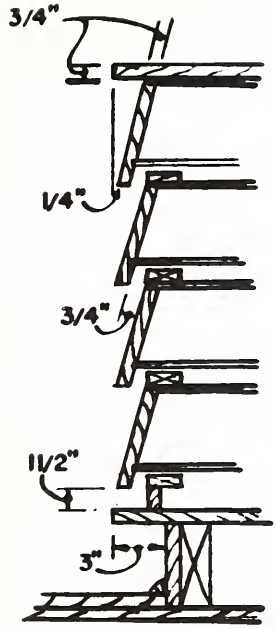



Figure 6–8 Construction of sloping drawer fronts, which eliminates handles.

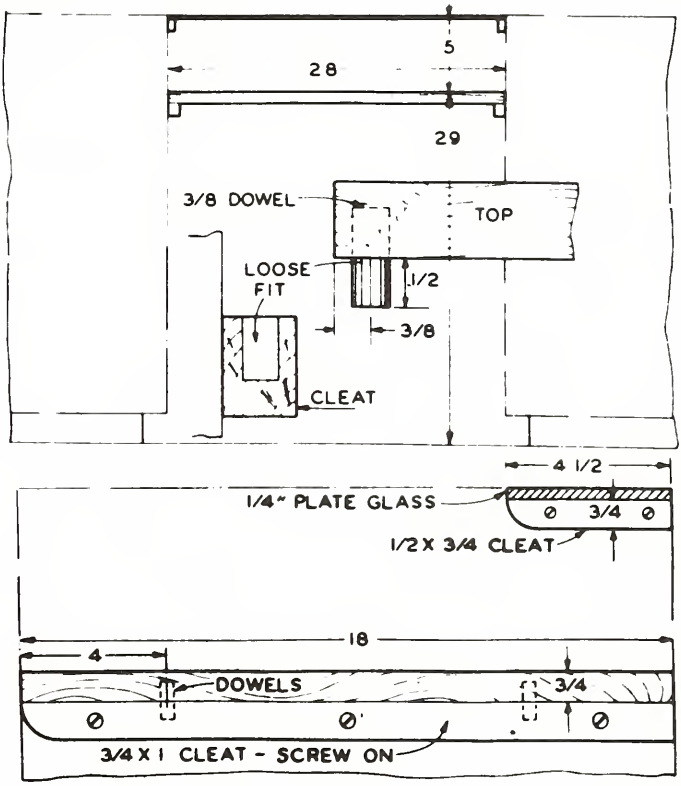



Figure 6–10 Attachment of a vanity shelf, using dowel construction. *Courtesy of Skil Corporation.*

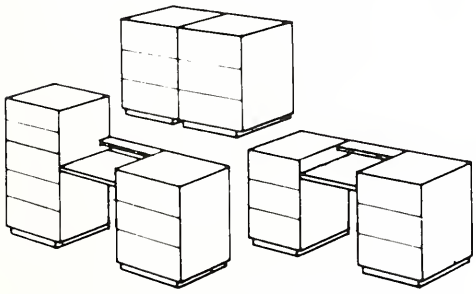
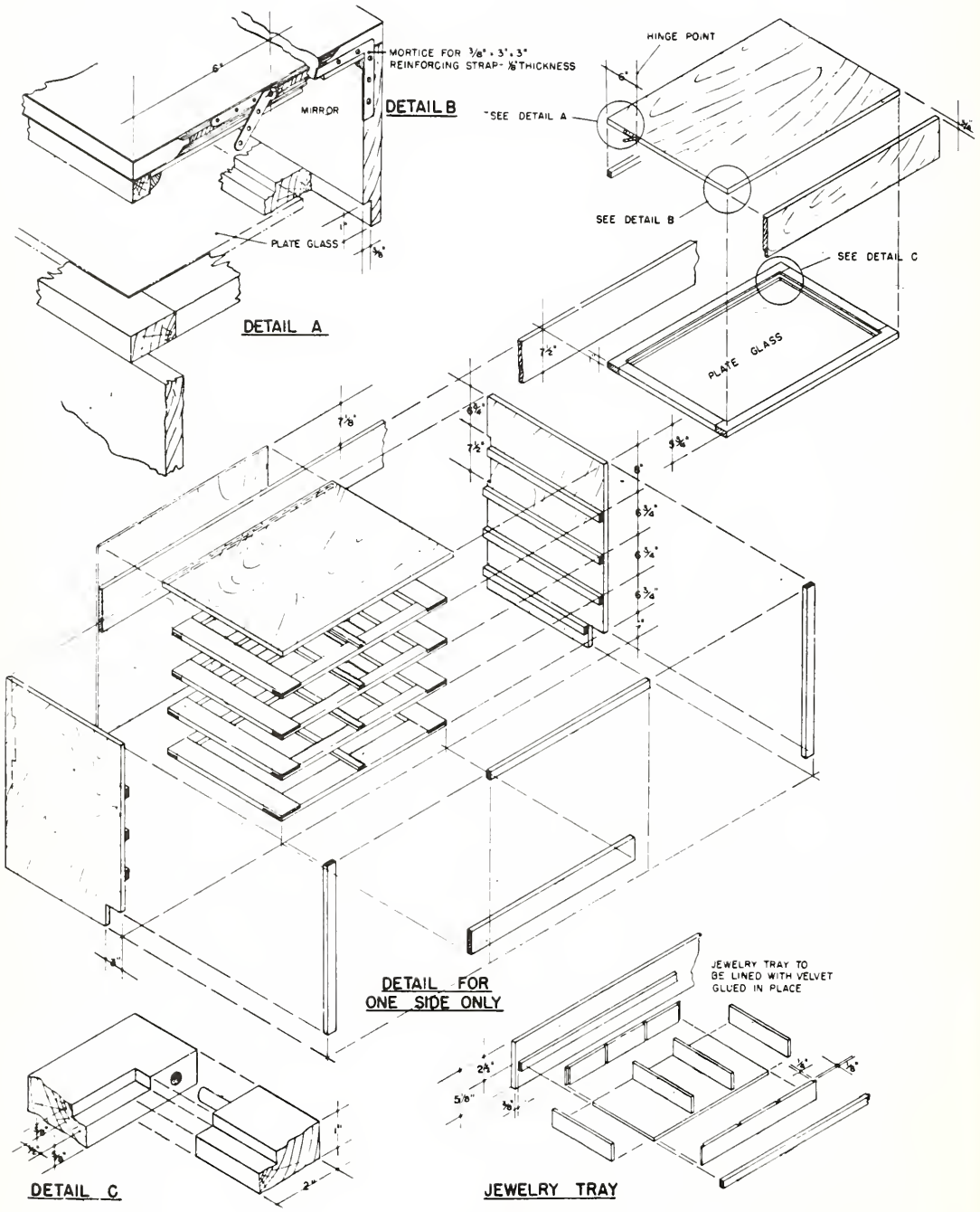


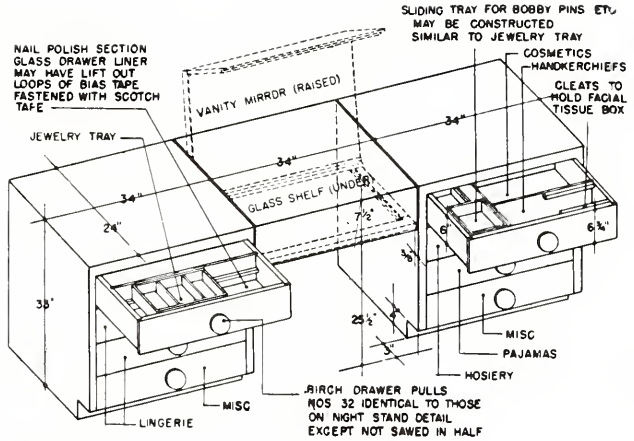
Figure 6–9 Arrangements of 2- and 3-drawer chests.

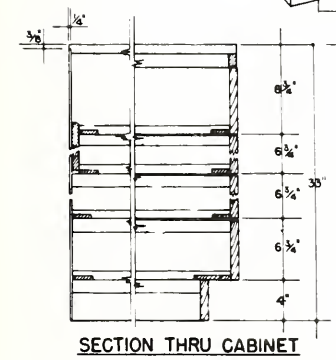
**Vanity tables.** There are two or three ways of attaching a vanity shelf and a small rear glass shelf between 2 chests. The easiest is simply to screw cleats to the side of each unit and drop the shelves into place on them. There is danger in this simple arrangement, however; someone unfamiliar with the construction might move one of the units, and drop the shelves onto the floor. To prevent this, if you want a better-looking job than just nailing the top in place, use the dowel construction shown in Figure 6–10. This serves as a lock to make the whole unit solid, yet permits removal of the shelf.

Figure 6–11 details a vanity with a lid which may easily be raised when needed. The mirror is attached to the inside of the lid. There are many handy drawers nearby for perfumes, jewelry, and "buttons and bows."

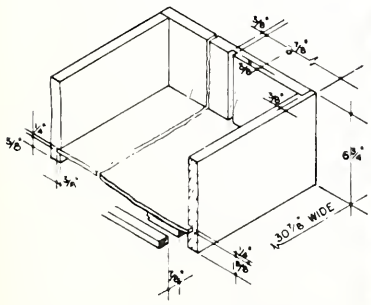
For a small bedroom, a door vanity might serve the purpose. The simple details in Figure 6–12 show how easily the dressing table can be installed. The mirror on the inside of the door and a glass shelf complete the picture.


MORTICE FOR 3/8" x 3" x 3" REINFORCING STRAP- 1/8" THICKNESS
MIRROR
DETAIL B
HINGE POINT
SEE DETAIL A
SEE DETAIL B
SEE DETAIL C
PLATE GLASS
DETAIL A
PLATE GLASS
DETAIL FOR ONE SIDE ONLY
JEWELRY TRAY TO BE LINED WITH VELVET GLUED IN PLACE
DETAIL C
JEWELRY TRAY



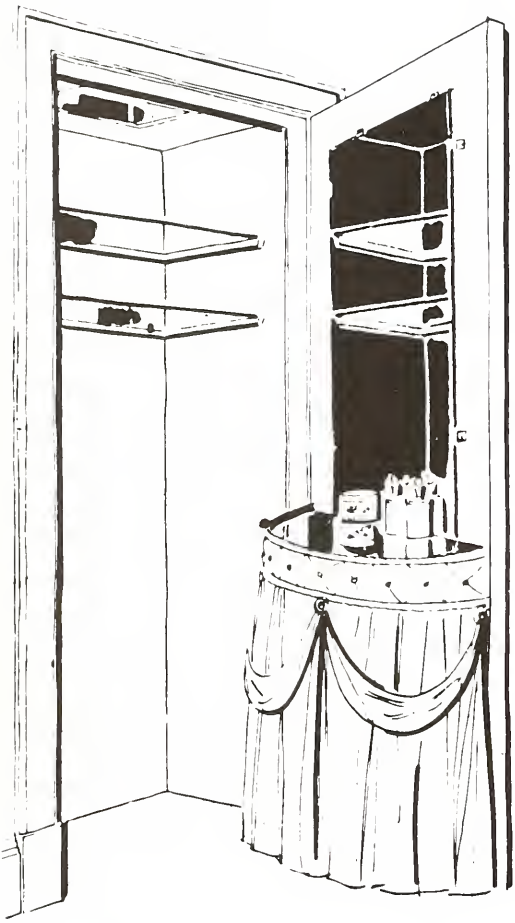

SECTION THRU CABINET




DRAWER DETAIL

Figure **6–11** Vanity table with a closing lid. *Courtesy of Malarkey Plywood.*





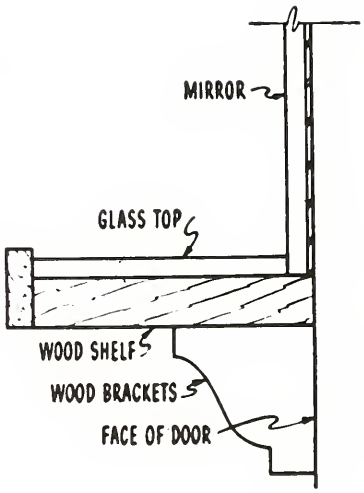



Figure 6–12 Door vanity. *Courtesy of Pittsburgh Plate Glass Company.*

*Stool.* For the vanities shown here, the stool illustrated in Figure 6–13 is ideal and its construction is simple. To give the slanted legs sufficient strength, a bevel cleat runs from the front to the back between each pair of legs. The legs are screwed and glued to this cleat. After the legs are in place, carefully drill the hole for a ½-inch dowel and glue it into place. (The fact that the legs are already assembled makes this quite easy.) You may use ordinary stuffing or foam rubber in the seat; the former is less expensive.

**Hideaway desk.** You can turn part of your bedroom into a business or housekeeping office with the desk shown in Figure 6–14. The front panel drops down to become a writing surface. Behind it are drawers and roomy shelves which are constructed like the desk units in Chapter 4. A cabinet for supplies occupies the lower part of the desk.

**Wardrobe closets.** Figures 6–15 and 6–16 show 2 large wardrobe closets of relatively simple design, which are both convenient and space-saving. The sliding doors are particularly appropriate for small rooms. Figure 6–18, designed for the wife, has plenty of space for hats, gloves, handbags, and shoes, and a convenient arrangement for clothes. Figure 6–16, for the husband, is similar except that it has a lighted dressing-room mirror over a shorter wardrobe. It has drawers for handkerchiefs, shoes, odds and ends—a place for everything.

A shelf-door wardrobe is shown in Figure 6–17.

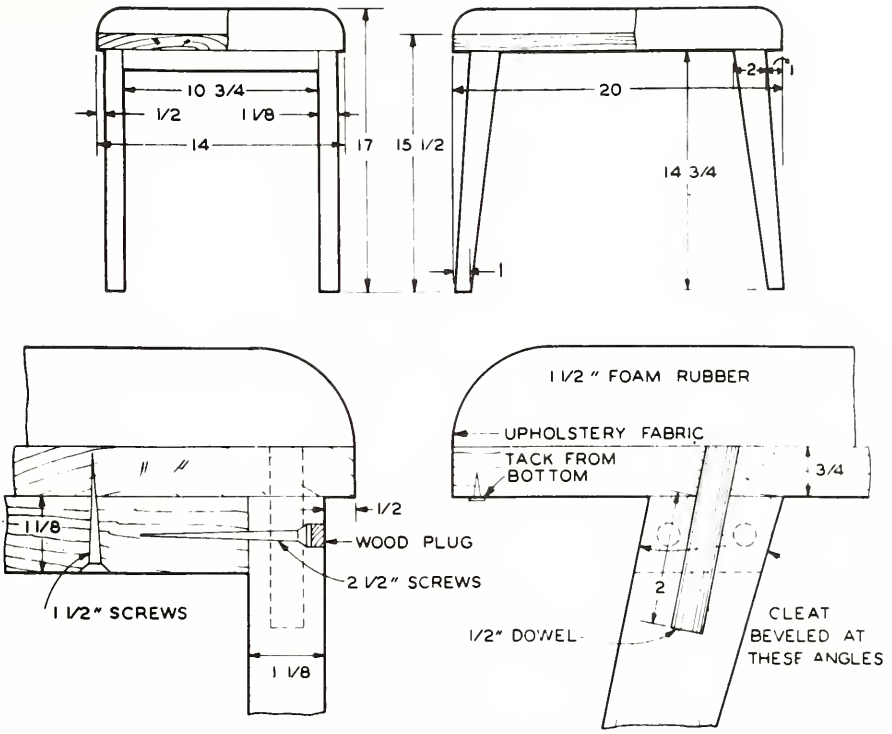



Figure 6–13 Stool for a vanity table.

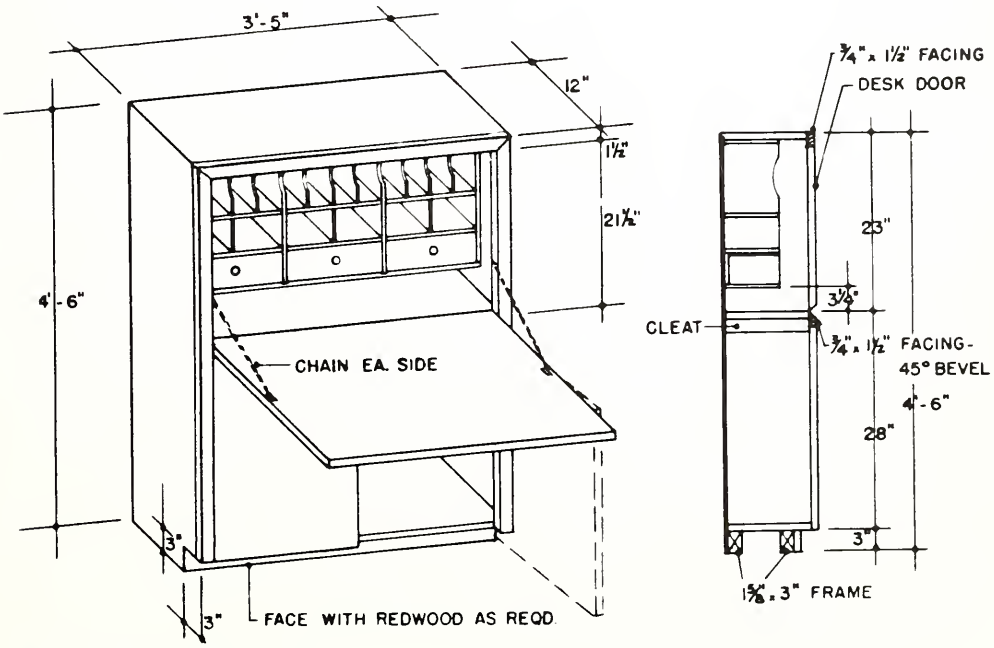
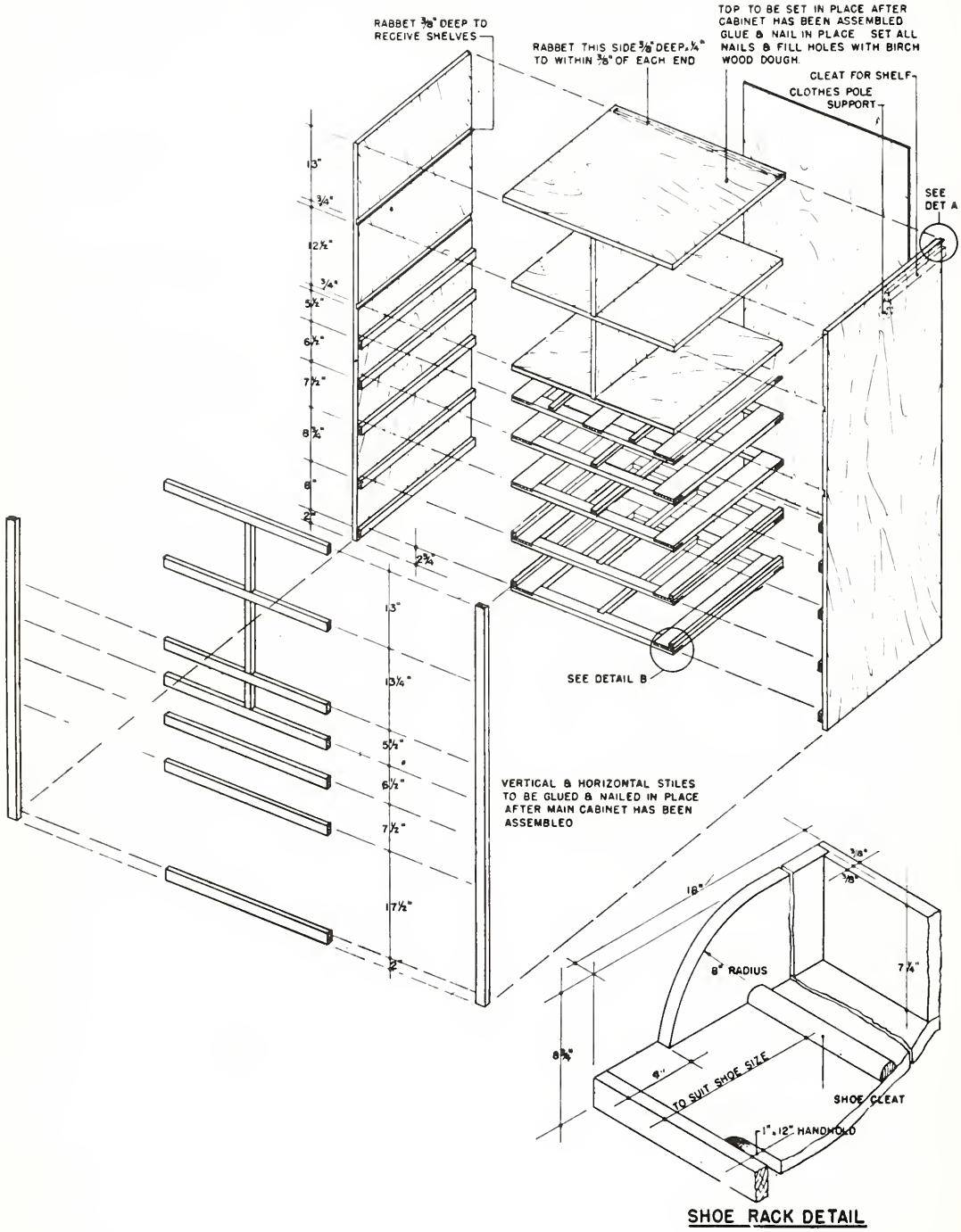



Figure 6–14 Hideaway desk.




SHOE RACK DETAIL

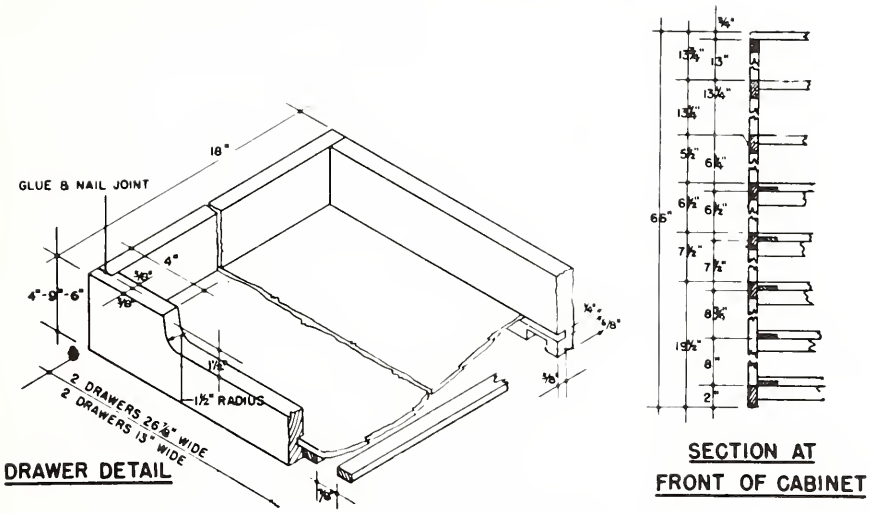
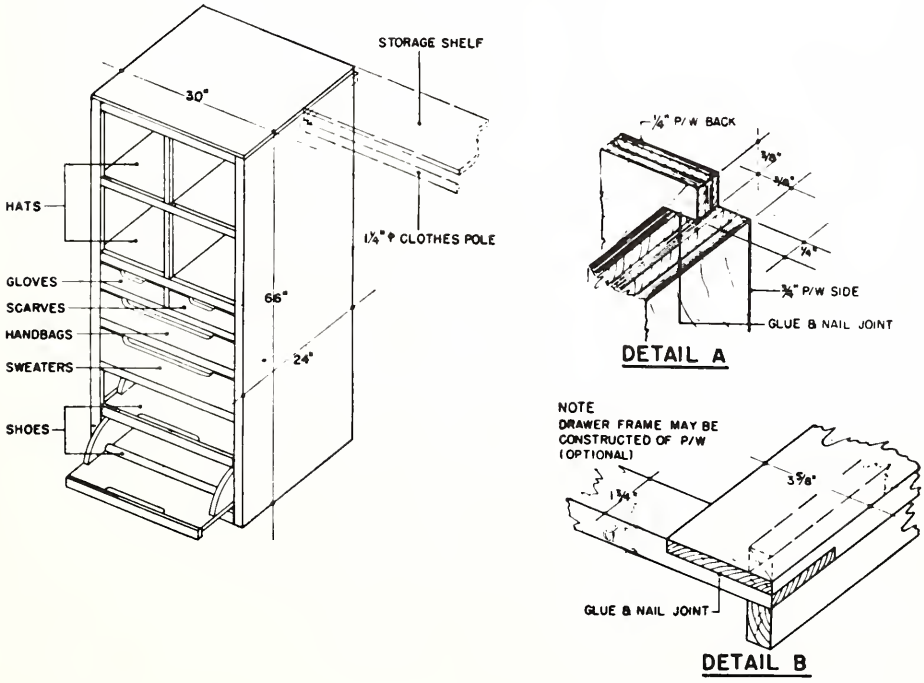
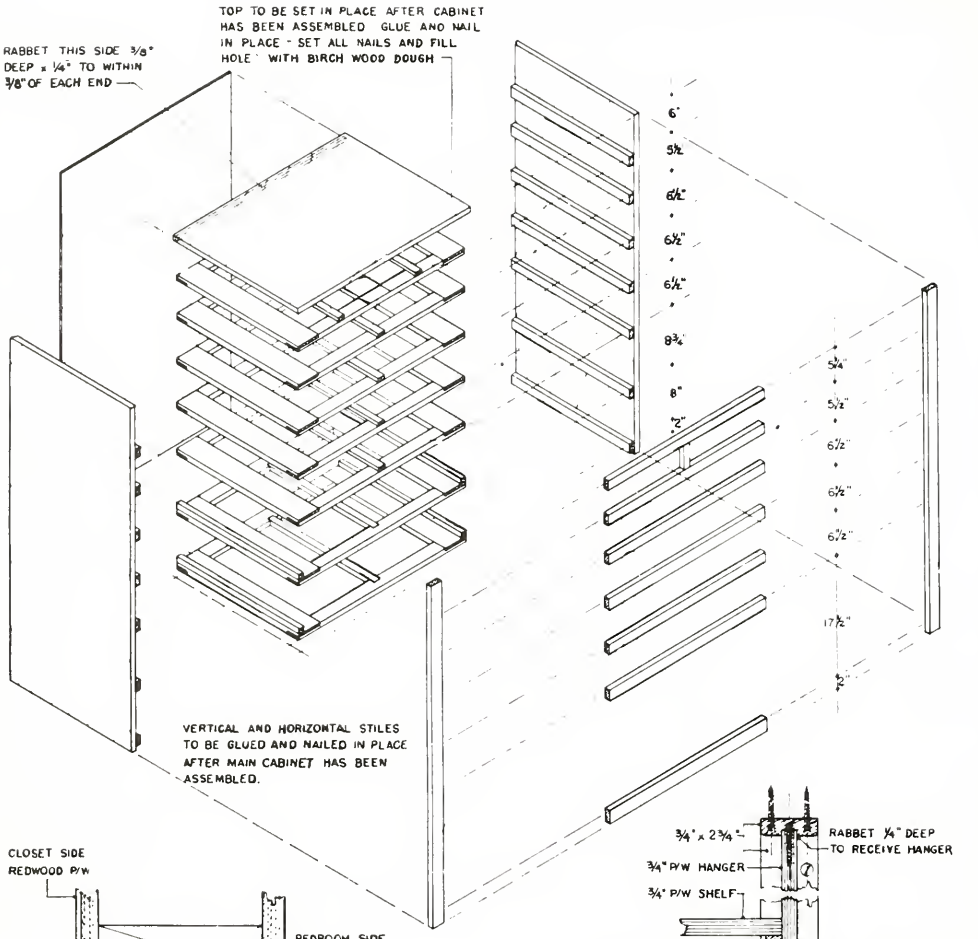
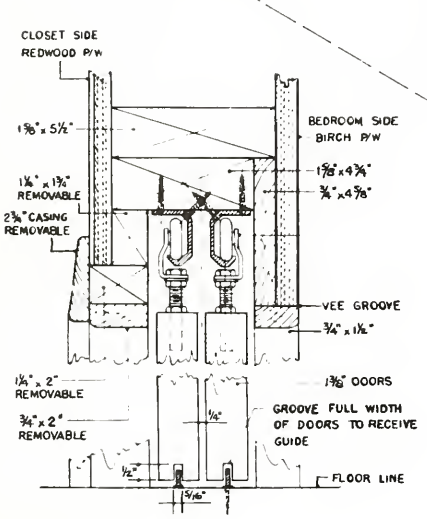



Figure **6–15** Built-in wardrobe closet designed for a woman. *Courtesy of Malarkey Plywood.*



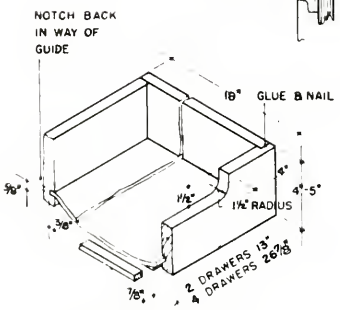


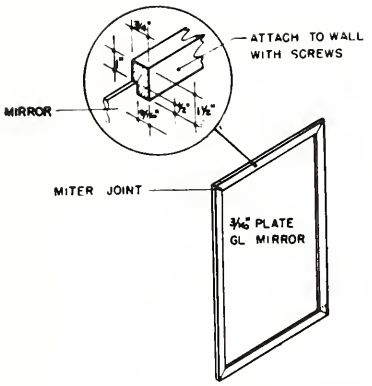

SLIDING DOOR DETAIL



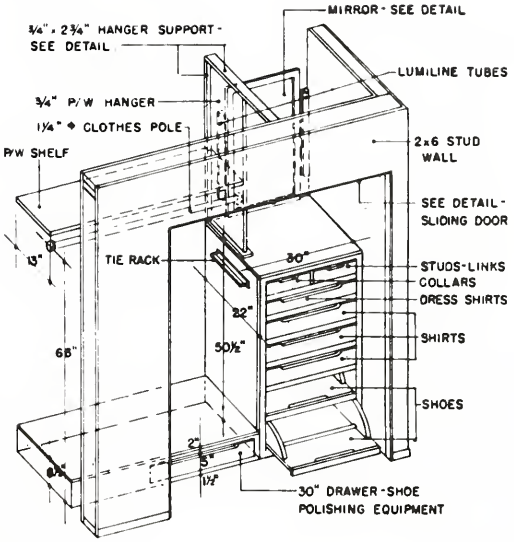

CLOTHES POLE HANGER DETAIL

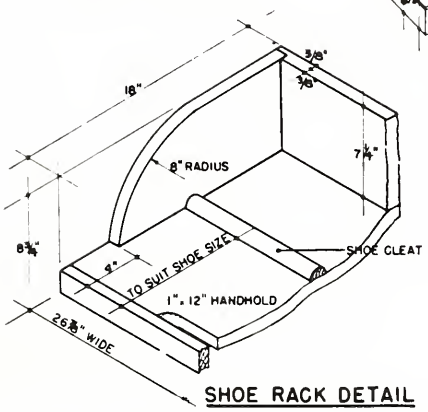



DRAWER DETAIL



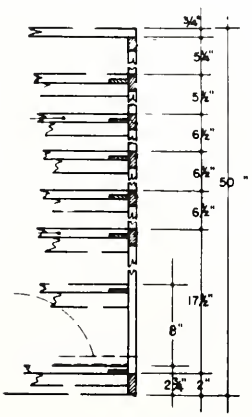

MIRROR DETAIL



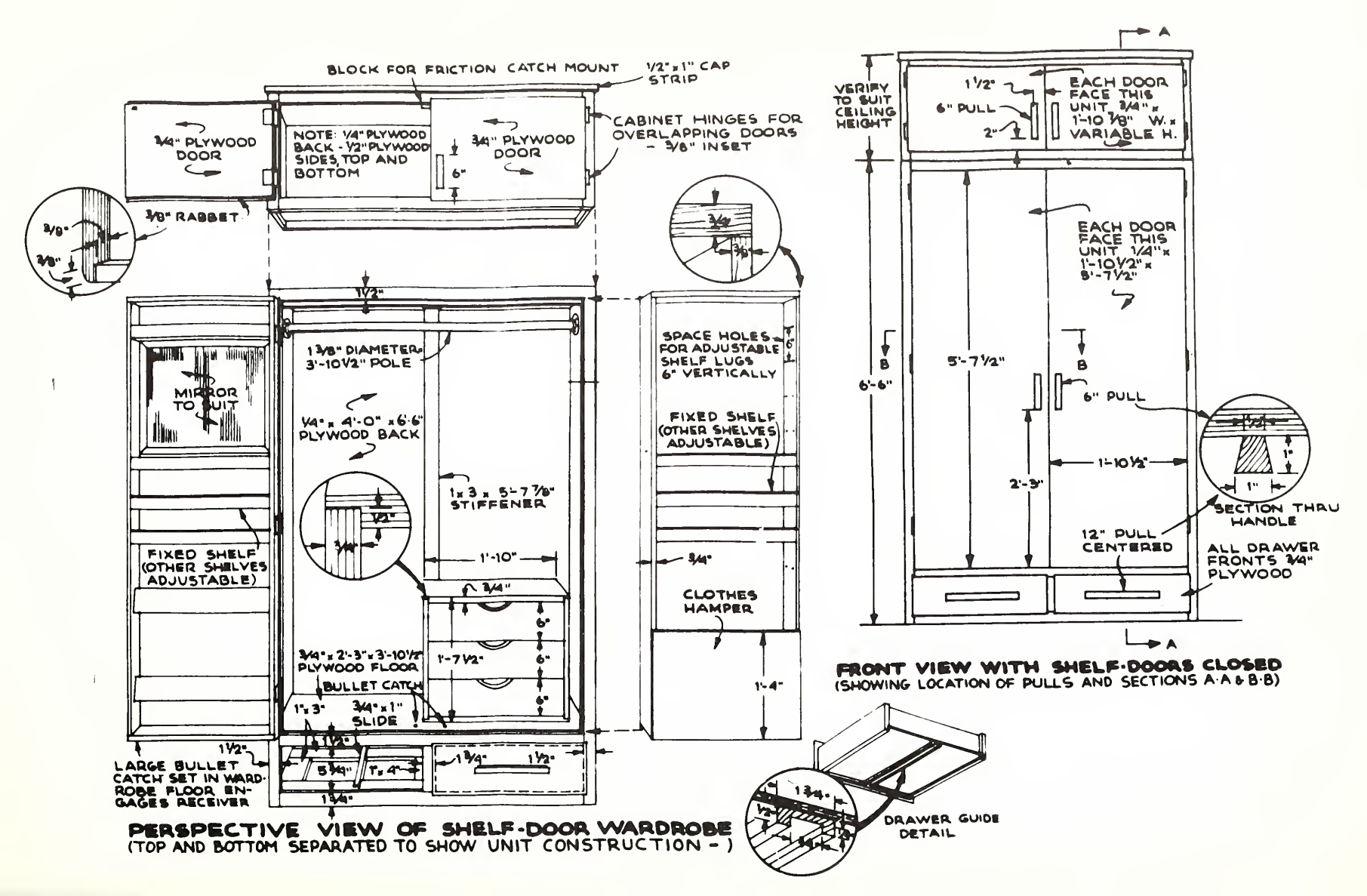

SHOE RACK DETAIL

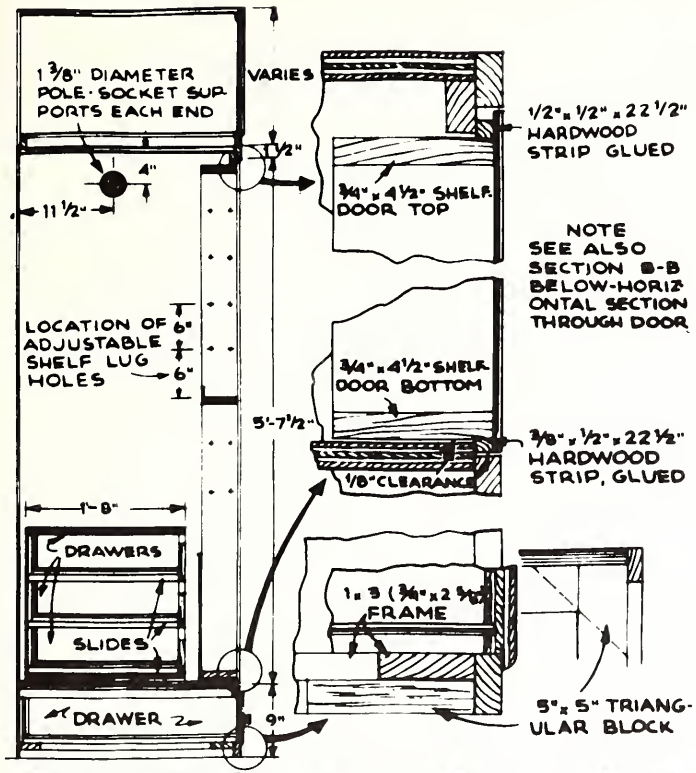
Figure 6–16 Built-in wardrobe closet designed for a man. The photograph shows a built-in shoe rack making use of the end space. *Courtesy of Malarkey Plywood.*



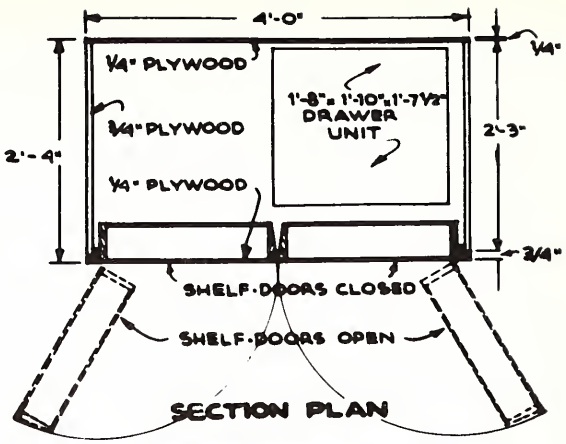

SECTION THRU FRONT OF CABINET



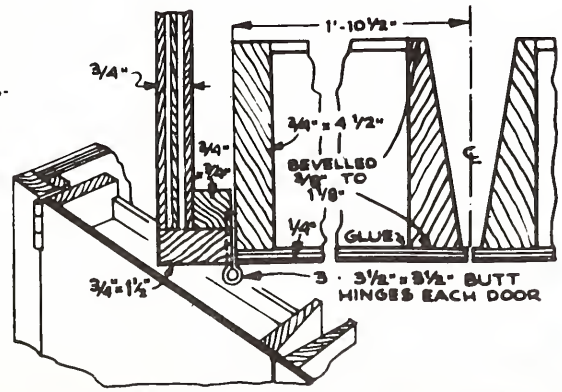

BLOCK FOR FRICTION CATCH MOUNT
1/2" x 1" CAP STRIP
CABINET HINGES FOR OVERLAPPING DOORS - 3/8" INSET
3/4" PLYWOOD DOOR
NOTE: 1/4" PLYWOOD BACK - 1/2" PLYWOOD SIDES, TOP AND BOTTOM
3/4" PLYWOOD DOOR
6"
3/8" RABBET
3/8"
3/8"
1/2"
1 3/8" DIAMETER 3'-10 1/2" POLE
MIRROR TO SUIT
1/4" x 4'-0" x 6'-6" PLYWOOD BACK
1 x 3 x 5'-7 7/8" STIFFENER
1/2"
3/4"
1'-10"
FIXED SHELF (OTHER SHELVES ADJUSTABLE)
3/4"
6"
6"
6"
3/4" x 2'-3" x 3'-10 1/2" PLYWOOD FLOOR
1'-7 1/2"
BULLET CATCH
1" x 3"
3/4" x 1" SLIDE
1 1/2"
1 1/2"
5 1/4"
7" 4"
1 3/4"
1 3/4"
1 1/2"
LARGE BULLET CATCH SET IN WARDROBE FLOOR ENGAGES RECEIVER
SPACE HOLES FOR ADJUSTABLE SHELF LUGS 6" VERTICALLY
6"
FIXED SHELF (OTHER SHELVES ADJUSTABLE)
3/4"
CLOTHES HAMPER
1'-4"
PERSPECTIVE VIEW OF SHELF-DOOR WARDROBE
(TOP AND BOTTOM SEPARATED TO SHOW UNIT CONSTRUCTION - )
1 3/4"
1/2"
DRAWER GUIDE DETAIL
A
VERIFY TO SUIT CEILING HEIGHT
1 1/2"
6" PULL
2"
EACH DOOR FACE THIS UNIT 3/4" x 1'-10 1/8" W. x VARIABLE H.
EACH DOOR FACE THIS UNIT 1/4" x 1'-10 1/2" x 5'-7 1/2"
B
6'-6"
5'-7 1/2"
B
6" PULL
1'-10 1/2"
2'-3"
1"
1"
SECTION THRU HANDLE
12" PULL CENTERED
ALL DRAWER FRONTS 3/4" PLYWOOD
A
FRONT VIEW WITH SHELF-DOORS CLOSED
(SHOWING LOCATION OF PULLS AND SECTIONS A-A & B-B)




VERTICAL SECTION THROUGH A-A WITH ENLARGED DETAILS




SECTION PLAN




PLAN AND PERSPECTIVE SECTION THROUGH B-B



Figure 6–17 Shelf-door wardrobe closet. *Courtesy of Douglas Fir Plywood Association.*

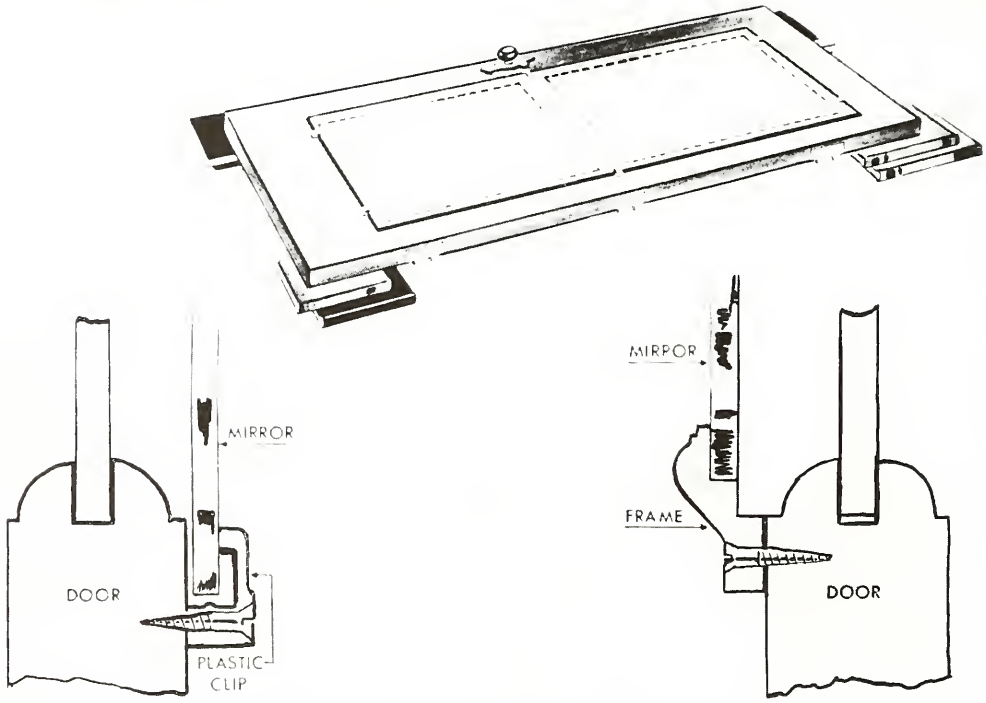



Figure **6–18** Installation of a mirror on a door. *Courtesy of Pittsburgh Plate Glass Company.*

**Hanging a door mirror.** A full-length door mirror is highly useful and easy to install. See Figure 6–18. In measuring for proper size, be sure that the mirror is large enough to overlap (by at least ⅝ inch on all 4 sides) the recessed paneling in the door, if any; and that it is not so large as to interfere with proper operation of the hinges and door hardware.

First, remove pins from hinges and lay door flat. Set mirror in place on face of door. Fasten by inserting screws in holes drilled in the molding, or in special clips. Two screws are required for both top and bottom and 1 on each side.

# CHAPTER 7

## YOUR CHILDREN'S ROOM

PLANNING a child's room involves more than concocting pretty color schemes and furniture arrangements. This room has an important influence on your child's life. It gives him (or her) the feeling that he has a definite place in the world. Here he begins to appreciate his surroundings, and here he learns pride of possession and responsibility for his belongings.

**Planning the room.** A child's room should stimulate his mental and physical growth by providing for his many activities. Encourage and develop your child's interests and hobbies by providing adequate space for them. If he is an avid reader, you can build the decorating scheme around his books and bookcases—or if he likes to draw or carve or model in clay, around an easel or a modeling table. Be sure to provide a place to keep toys, books, and other belongings where they will be readily accessible. Make neatness easy to achieve.

If the child is old enough to express a preference, let him decide the decorating motif and color scheme. Too many children's rooms express the mother's interests rather than the child's.

Built-in furniture and cabinets in children's rooms leave more space free for play and make small rooms seem larger. Properly designed built-ins will be suitable for use when the child is older and wants grown-up furnishings in his room. Figure 7–1 shows a built-in unit for a boy's room that is useful from the time he is three until he is in college. This arrangement gives the small boy plenty of storage space and a large shelf. As he reaches school age, such changes as the addition of drawers to the cabinet make a big difference; all that is required is to add runners to the frame. (Details of drawer unit can be found on page 102.) Later, the unit serves as a practical desk, and the room takes on a grown-up look, even though the basic arrangement is the same. The desk top may be made of ¾-inch plywood faced with plastic or hardboard.

When 2 children must share a room, it is sometimes wise to divide it into 2 sections. Centrally located storage cabinets, a folding door, decorative floor screens, or a plywood partition will give each his own domain. To erect a studless plywood partition, nail ¾-by-1-inch plates on the floor and on the ceiling. Then set a panel of ¾-inch plywood on the floor plate and toenail it at top and bottom. To complete the partition, apply a molding at base and ceiling, and finish it to agree with the rest of the room.

Linoleum, rubber tile, greaseproof asphalt tile, and latex-bonded terrazzo are desirable floor surfaces for children's rooms, since they are smooth, resilient, and easy to clean. For younger children, it is advisable to have washable wall materials.

Good lighting is of utmost importance,

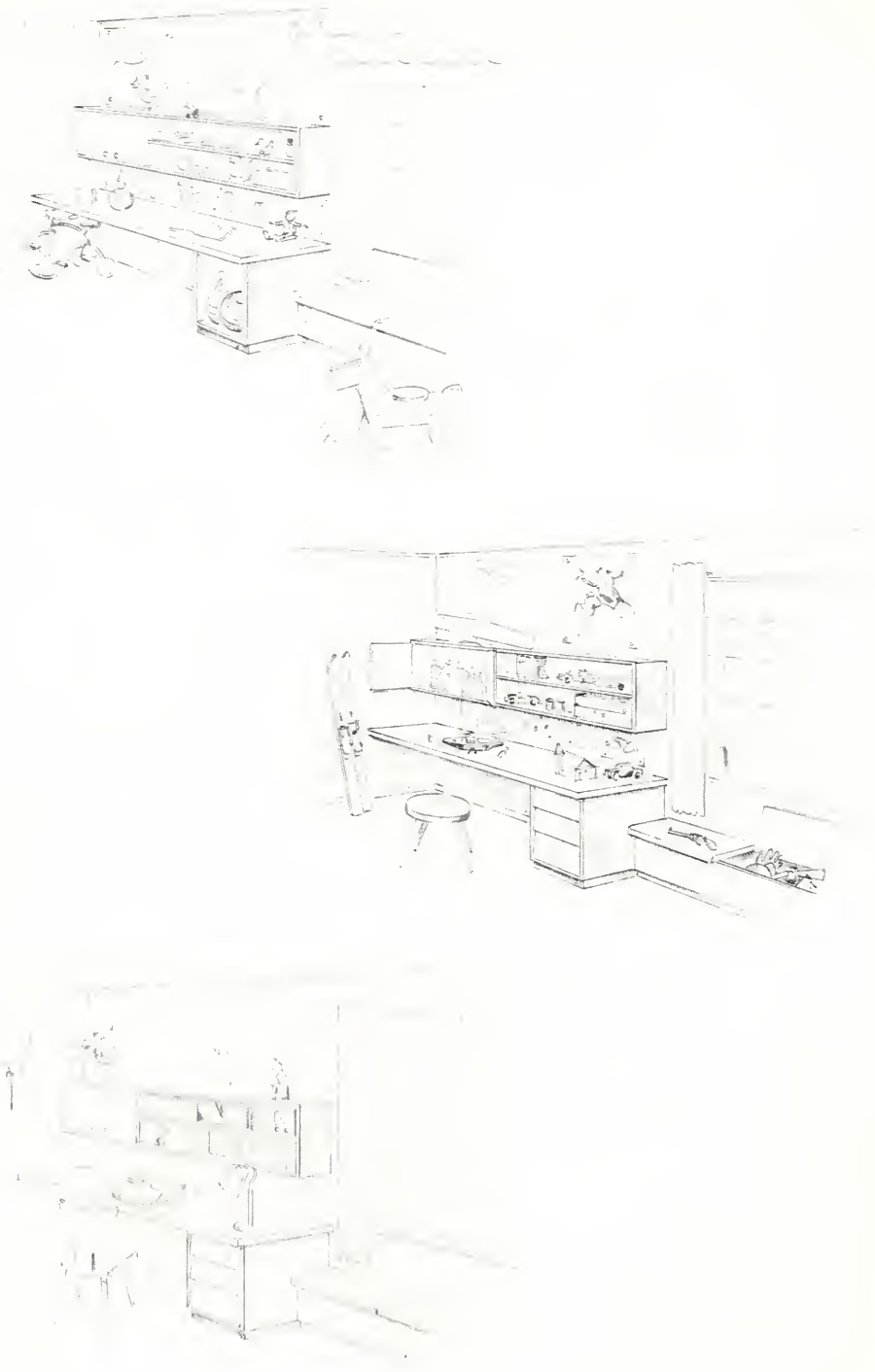


Figure **7–1** A built-in unit for a boy's room that "grows up" with the boy. The units may be made like any of the shelves and cabinets previously described. *Reprinted from* American Legion Magazine.

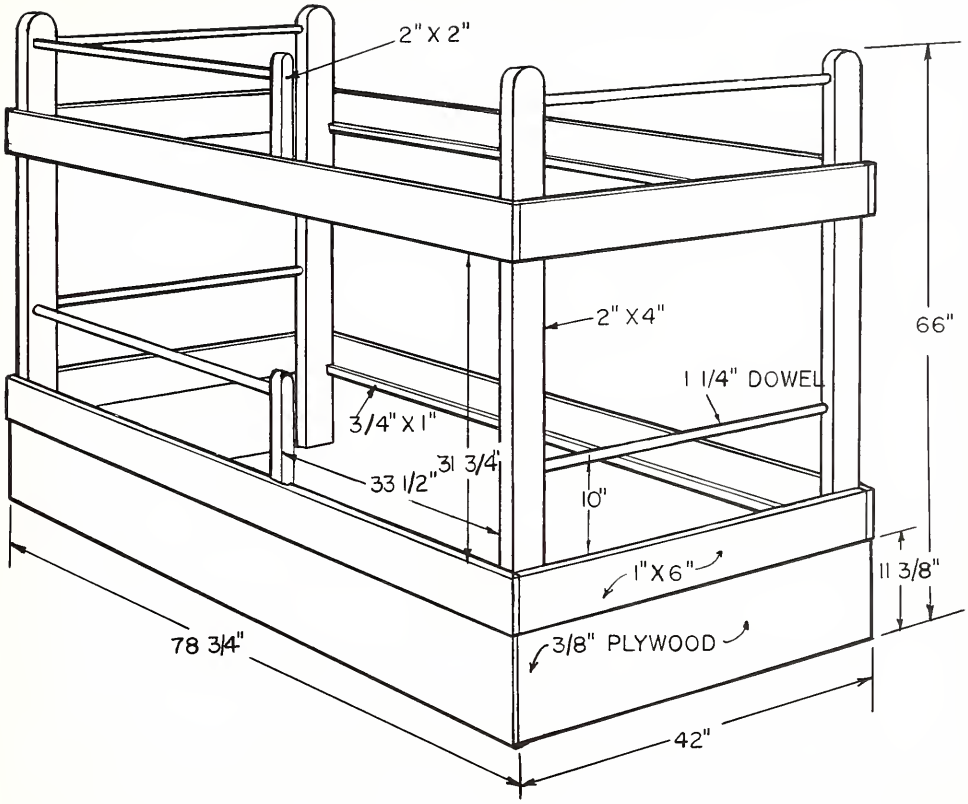



Figure 7–2 Built-in double-decker beds.

especially in a young person's room. An indirect ceiling fixture or an indirect standard lamp is good for general lighting, but there must be adequate local light for every visual task in order to avoid eyestrain and fatigue. See that light for studying comes from the left for the right-handed child, from the right if he is left-handed.

**Built-in beds and bunks.** Start your planning with the bed or beds. When building a bed or bunk, measure the over-all dimensions of the box spring and mattress that you are going to use, and add 1 inch to allow for the inside length and width of the bedframe. Details for a built-in twin-sized bed can be found in Chapter 4.

As a space saver, the double-decker beds shown in Figure 7–2 are ideal for younger children. The 2 units are built to house standard 39-by-72-inch (twin-bed size) cable or link springs. (Even if you think your springs are of standard size, measure them before the frame is made.) Rope springs can be woven by lacing rope into 5-inch squares through holes in the sides and ends of a firmly constructed, separate wooden frame. Although a rope spring will sag in time, it will satisfactorily bear the weight of a small child.

A drawer or drawers can be added under the lower bunk, as underbed storage space for extra linen and blankets. Detachable guardrails are desirable during the children's early years.

Another bunk-bed arrangement is

shown in Figure 7–3. It avoids having one bunk directly above the other and thus gives headroom for the lower bunk. Note the cabinet located under the upper bunk.

The detachable ladder is made by dadoing the ends of the steps into the sides of the ladder and securing them with countersunk screws, or with roundhead screws and washers, as pictured in detail in the inset drawing.

**Wall storage units.** Every child's room needs a large amount of storage space, plenty of shelf space, and a long desk or general worktable set at a convenient height.

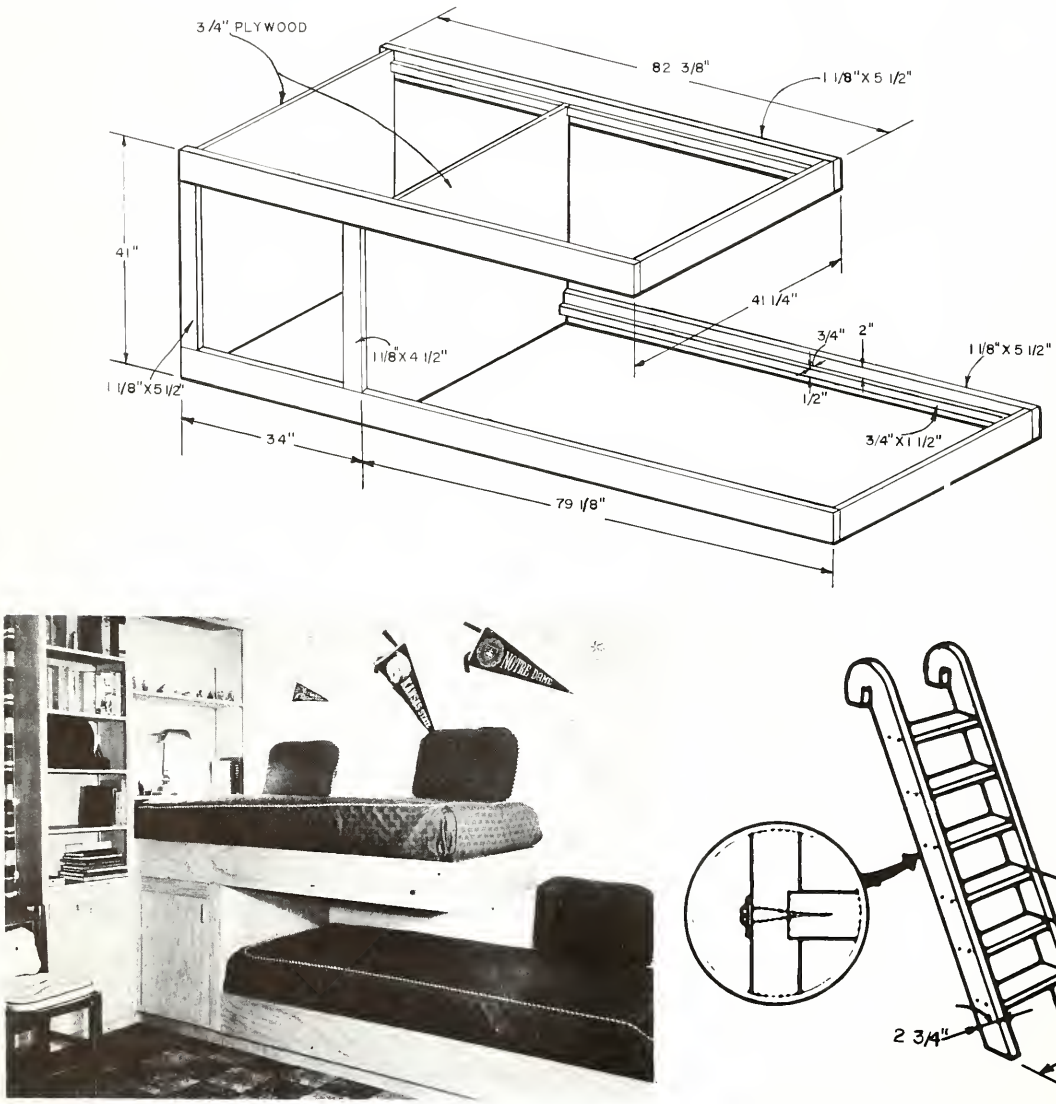



Figure 7–3 A bunk-bed arrangement which provides headroom and a storage cabinet.



Figure **7–4** Storage wall for a child's room. Construction details are shown in Figures 7–5 to 7–9. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

These needs can be met by an arrangement along one wall of the bedroom (see Figure 7–4) with the loss of only about 24 inches of floor space. This shelf-storage wall includes such features as adjustable shelves, a drop ceiling, a concealed radiator, a handy pull-out board which serves as a desk, and flush drawer cabinets. The window seat can be padded. No overall dimensions are given, since they and the number of units may vary. Instructions follow for the units to the left of the window, the remainder of the wall being similarly constructed.

Shelves (Figure 7–5) can be easily adjusted to proper height by moving supports up or down. Building of shelf units can be made simpler by using perforated metal strips instead of drilling holes as shown. At the top of the shelves you may use either a high open shelf (as shown in photo) or a drop ceiling. Construction of the drop ceiling to give a snug, flush fit is shown in Figure 7–5. It is covered with plasterboard or plywood and edge-trimmed with quarter-round molding. Shelves bordering the window may have edges rounded (as shown in Figure 5–5) to avoid a "boxed-in" look, and to permit passage of more light; they also add a decorative touch.

The method of hiding a radiator in order to present an unbroken surface is illustrated in Figure 7–6. The perforated grille permits radiation of heat. For better warming of cold air along the floor a 4- to 6-inch space under the grille may be used. Note that the grille frame may be detached by means of bullet-type catches.

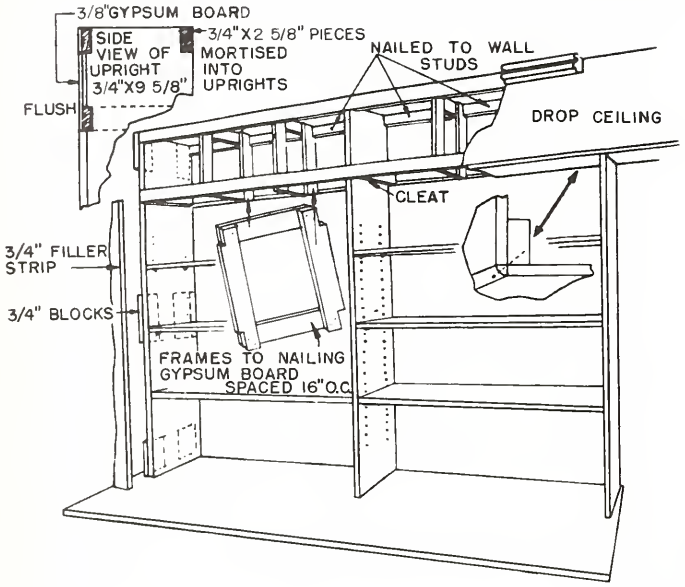



Figure 7–5 Construction of shelves and a drop ceiling for storage wall.

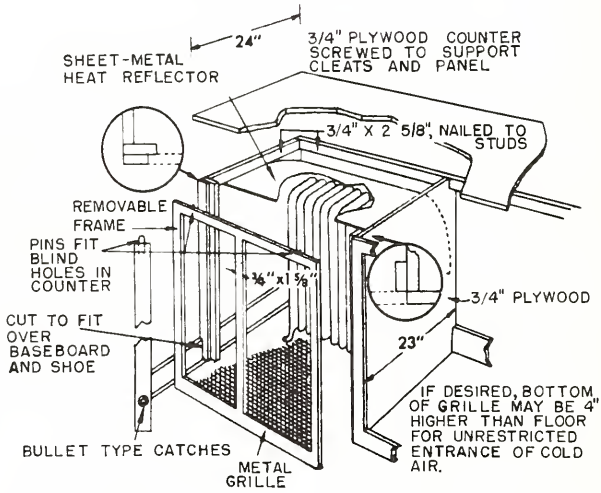



Figure 7–6 Concealed radiator in storage wall.

Make the pull-out board (Figure 7–7) high enough (about 24 inches) to serve as a child's playtable or as a typewriter stand. Hardwood cleats at each end of the board permit it to slide smoothly in steel channels. Finger grips are grooved in the bottom edge of the board, and a hardwood backstop makes it impossible to slide the board beyond them.

In the drawer-cabinet assembly shown in Figure 7–8 note that the uprights are mortised to take cross rails. Make all drawer guides of hardwood (maple or birch). Bottom frame is inset and notched to fit flush with drawer separator. Except for drawer guides, which are glue-coated and screwed to the sides, all joints are nailed. Anchor cabinet to wall studs by driving nails through rear cross rails.

Flush drawers to fit the cabinet can be made if the diagram (Figure 7–9) is carefully followed. Note that drawer

depth is 2 inches less than depth of cabinet, and stops are installed at rear of each frame. Sides are glued and screwed to front and back. Drawer bottoms should be made of hardboard; if they are unusually wide add a supporting cleat, as shown.

Another child's storage wall is shown in Figure 7–10.

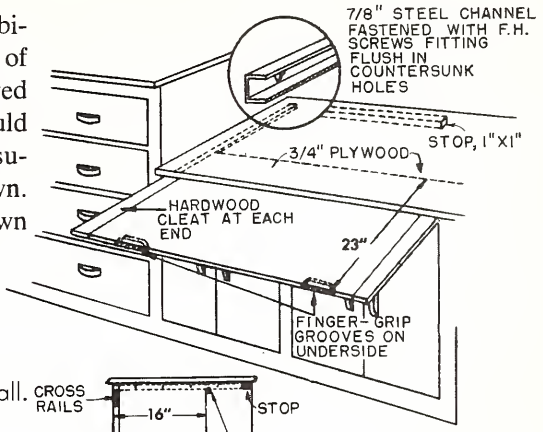
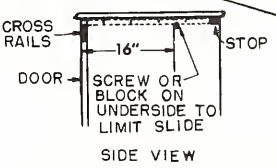



Figure **7–7** Pull-out board for storage wall.



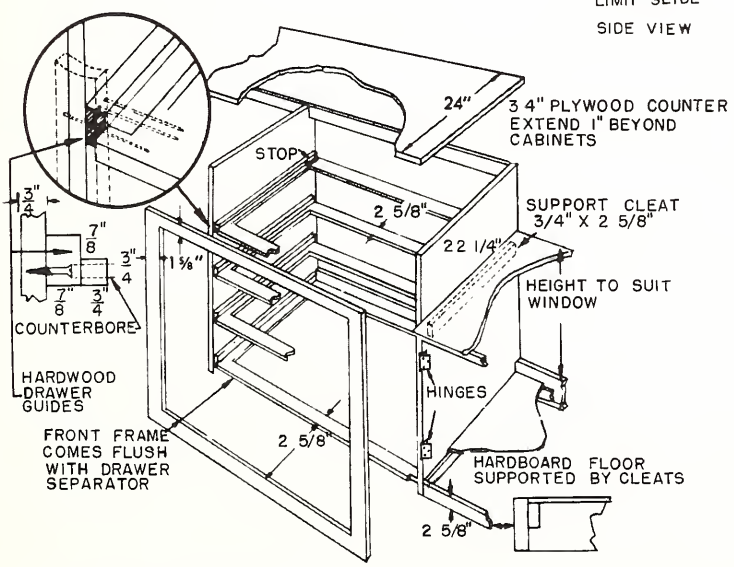




Figure **7–8** Flush-drawer cabinet for storage wall.

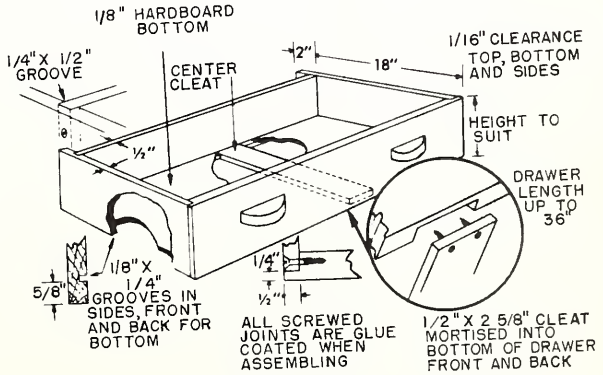
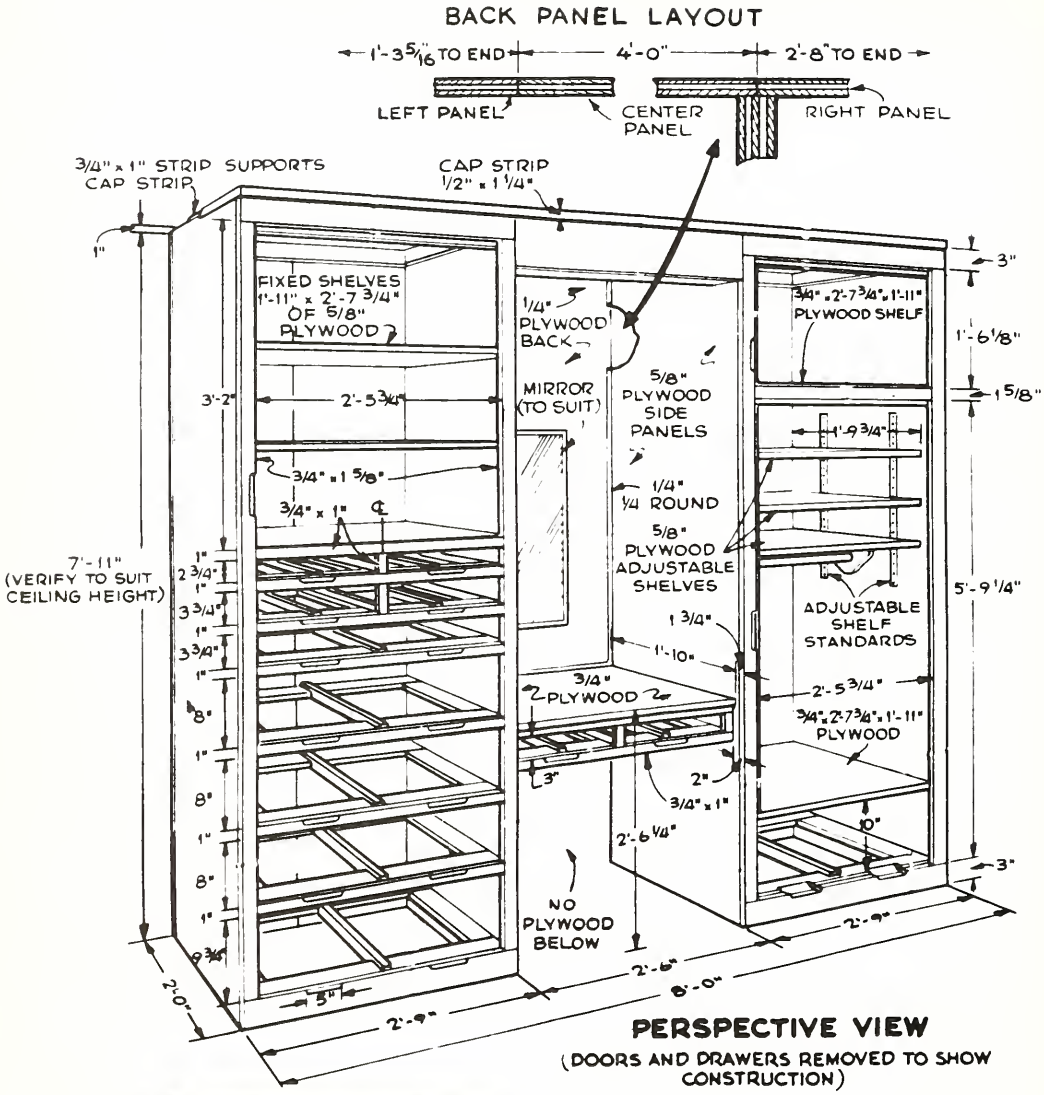



Figure **7–9** Construction of flush drawer.



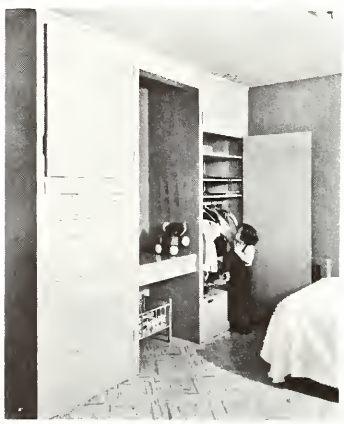



Figure **7–10** Child's storage wall combining closet, dresser, and toy storage. *Courtesy of Douglas Fir Plywood Association.*

**The wardrobe closet.** The handy closet shown in Figure 7–11 can be easily built into an existing room or included in a new room. It has been carefully planned for a young girl's clothing and accessories.

Among its features is an adjustable clothes rod which may be raised as the

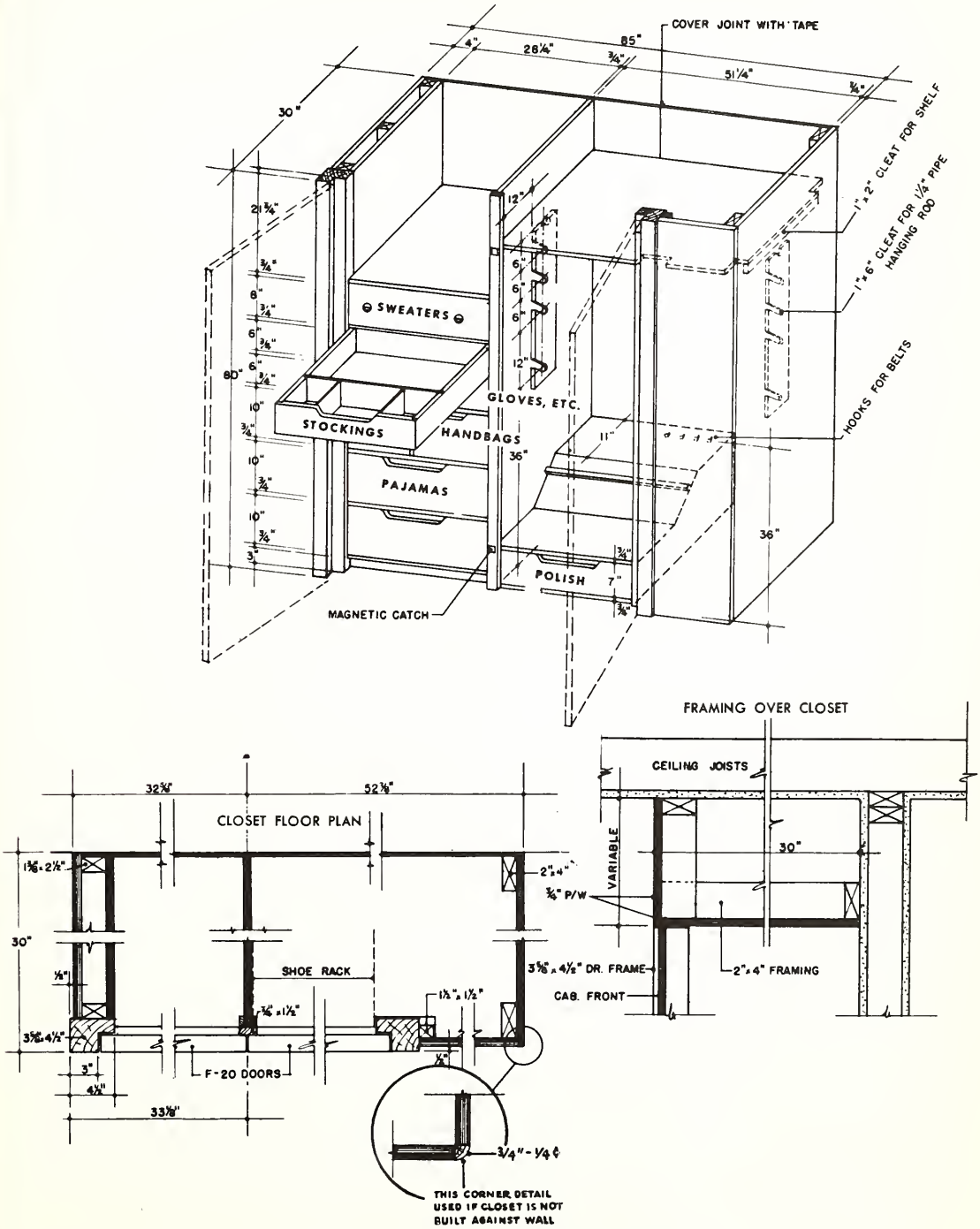



Figure **7–11** Girl's wardrobe closet. *Courtesy of Malarkey Plywood.*

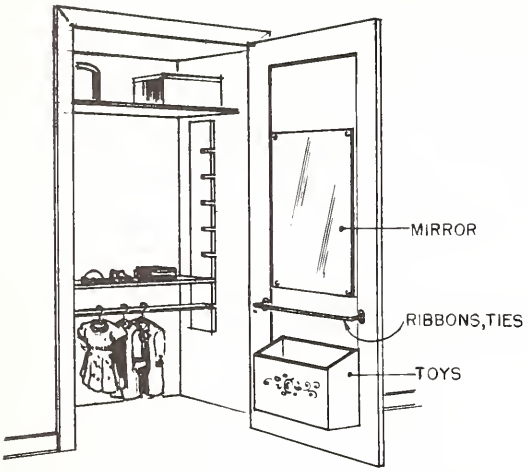



Figure **7–12** Adapting a closet for a child's use.

child grows. The pole cleats are cut as shown to provide a means by which the hanging rod may be moved. Holes should be every 6 inches on center, starting with a 3-foot height for a three-year-old, up to a 5½-foot height for a debutante.

The special drawers, graduated in size, can be fabric-lined for lingerie, stockings, and other clothing that snags easily; or they may be mothproofed for sweaters and woolens. Labeling the drawers encourages smaller children to put clothes where they belong.

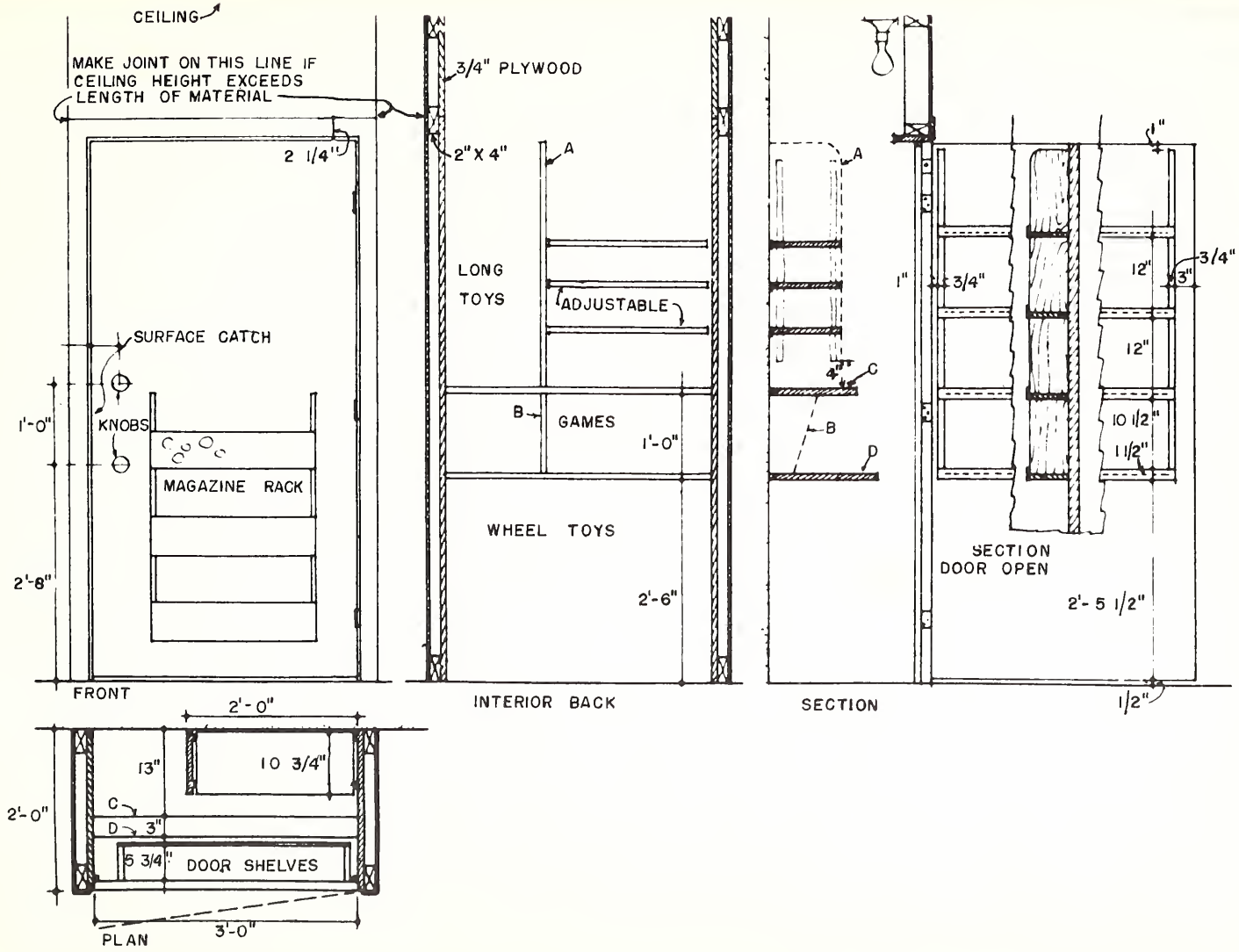
A neat rack for shoes is included, with a drawer below which keeps polish and brushes within easy reach. A full-length mirror may be hung on one of the doors. (See page 114 for instructions on installing a mirror on a door.)

*Adapting closets to a child.* The ordinary household closet is difficult, and sometimes impossible, for a child to use, but this can be overcome easily by relocating shelves and hooks to the child's level. The closet illustrated in Figure 7–12 shows a few essential changes which can be easily made. Depending on the size and shape of the closet, and the owner's needs, other arrangements can be worked out. The first step in reorganizing any closet is to measure it. Then plan your equipment to fit to best advantage. Remember that the design must be flexible enough to be altered as the child grows.

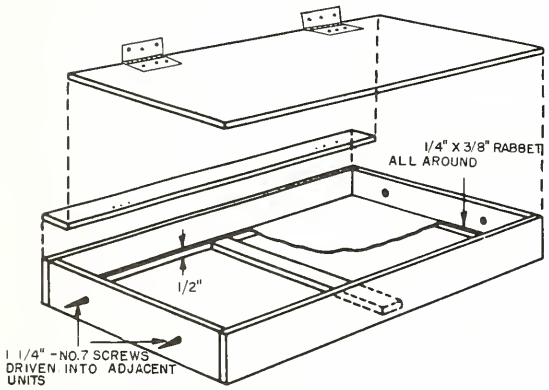
Figure 7–13 shows a child's toy-storage closet converted from an average shallow adult-size closet to provide convenient storage space for large games, juvenile sporting goods, and wheel toys such as velocipedes and doll carriages. The front of the closet door is utilized as a storage place for children's books; open-faced magazine racks are hung within easy reach of the youngsters so that they can choose their books and put them away without adult assistance.

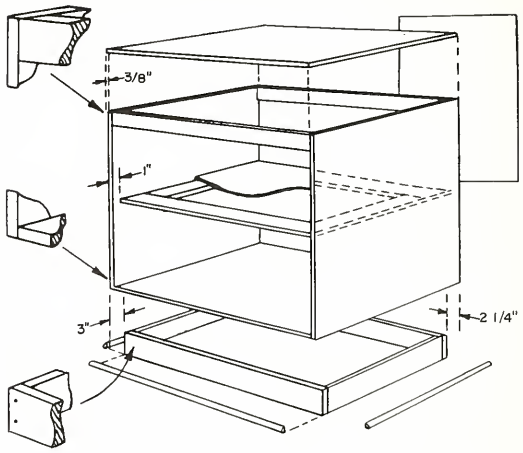


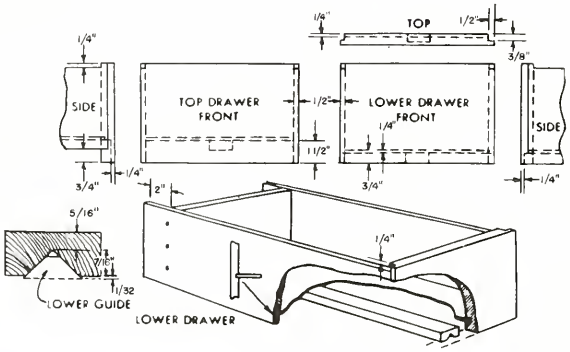
Figure **7–13** A closet used for children's toys and amusements. Plans are given opposite. *Courtesy of American Toy Institute.*


CEILING
MAKE JOINT ON THIS LINE IF CEILING HEIGHT EXCEEDS LENGTH OF MATERIAL
2 1/4"
SURFACE CATCH
KNOBS
1'-0"
MAGAZINE RACK
2'-8"
FRONT
3/4" PLYWOOD
2"X 4"
A
LONG TOYS
ADJUSTABLE
B
GAMES
1'-0"
WHEEL TOYS
2'-6"
INTERIOR BACK
A
C
B
D
1"
3/4"
12"
3"
12"
10 1/2"
1 1/2"
SECTION DOOR OPEN
2'-5 1/2"
1/2"
SECTION
2'-0"
13"
10 3/4"
C
D
3"
5 3/4"
DOOR SHELVES
2'-0"
3'-0"
PLAN

**Vanity tables.** The desk-vanity with a raise-up mirror shown in Figure 7–14 is ideal for any teen-age girl. First make the cabinet base, fastening front and back pieces to side pieces. For toe space, base comes 3 inches behind front, 2¼ inches





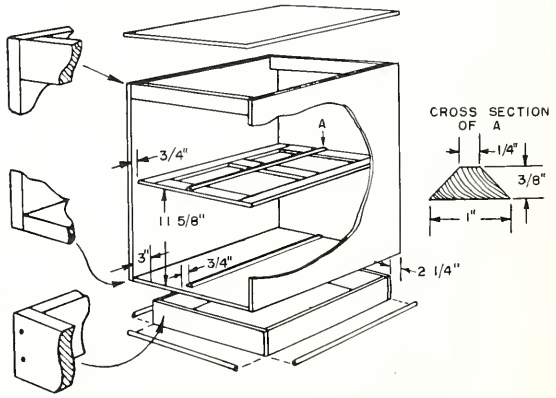




Figure **7–14** Desk-vanity. *Reprinted from* Popular Home*—United States Gypsum Corporation.*

inside of sides, flush with rear. Next nail cabinet bottom to base. Then fasten sides to overlap bottom. Install the top crosspieces, then the top, which projects ⅜ inch at front but is flush at sides and back. Assemble shelf frame and cover it with ¼-inch hardboard. For greater strength, shelf frame should have center crosspiece. Shelf inside of cabinet is inset 1 inch at front to provide door space. For doors, use 7-ply plywood to minimize warping. Doors must have no less than 1/16-inch clearance all around. Fit each with a combination stop and catch.

Next, make base for drawer unit and attach bottom, sides, top crosspieces, and top as before. Next make frame to support upper drawer, with front edge ¾ inch from cabinet front. Be sure lower edge of frame is exactly 11⅝ inches above bottom at all points. Do not fasten triangular drawer guides A in place until drawers are fitted. With drawers partly pulled out, nail down rear ends and centers of guides, then front ends. Lower guide is ¾ inch from front and also serves as drawer stop. Hold-down strips are nailed to sides to prevent top drawer from tipping when pulled out over half way.

The width of the drawers allows 1/16-inch clearance on each side. Fronts may be edge-sanded or planed slightly for clearance. Drawer sides and back come ¼ inch below top of fronts. Cut and rabbet front, sides, and back (¼ by ¼ inch), glue hardboard bottom in grooves. Apply glue to all joints, screw sides to front and back with 1-inch No. 6 flathead screws. Center V-grooved guide on bottom accurately; it fits notches in front and back and is screwed to them. The 2 drawers are slightly different; bottom of top drawer is raised ¾ inch so that drawer front covers drawer-support frame.

To make the raise-up top for the vanity, first glue the hardboard bottom in rabbets in sides, front, and back. Then fasten center crosspiece underneath to support the bottom. Attach 3-inch rear strip and hinge top to this with butt hinges or piano hinge. Top projects ⅜ inch at front to match companion pieces. When raised it rests against the wall; a mirror is attached to underside.

To assemble the 3 units (cabinet, drawer section, and vanity), remove the baseboard to allow back of units to fit snugly against wall. Screw sides of top unit into sides of drawer and cabinet sections. Then replace baseboard on wall up to cabinets and under vanity. Miter ends of base shoes to fit around cabinet bases and nail shoes to floor.

Figure 7–15 is a simpler type of vanity

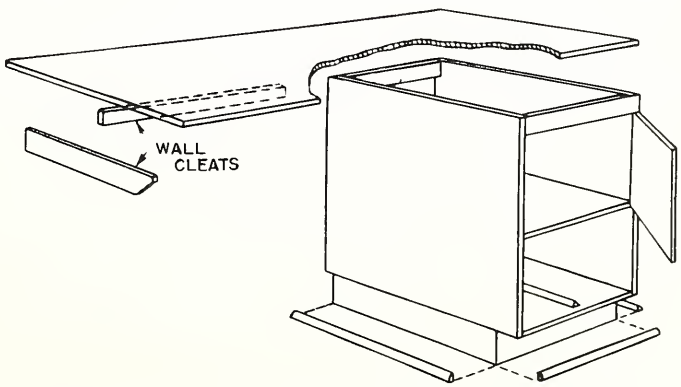



Figure **7–15** A simple vanity which fits into a corner.

which is meant to fit in a corner. Cabinet bottom is hardboard nailed to the frame as shown. Top extends to wall and is supported by cleats nailed to studs in the wall. Follow the assembly methods given in Figure 7–14 for drawer unit.

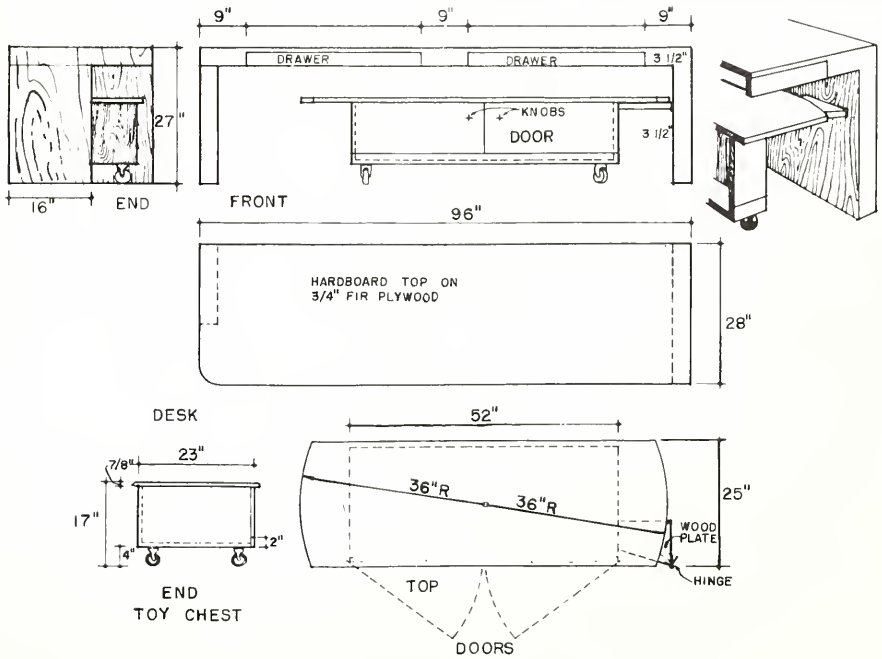
## BUILT-INS FOR WORK AND PLAY

**Child's play center.** To meet children's desire for the largest possible workbench and playtable, make a bench 6 feet long and 2 feet wide which slides under a table against the wall when not in use. The bench shown in Figure 7–16 does double duty as a toy-storage cabinet. The table unit includes drawers large enough to accommodate large sheets of drawing paper.

The largest tacking panel your space can accommodate may be attached to the wall above the bench; it gives the child



Figure **7–16** Child's large workbench, which slides under the playtable against the wall. The sliding-door cabinet at left in the photograph is shown in Figure 7–17. *Courtesy of American Toy Institute.*



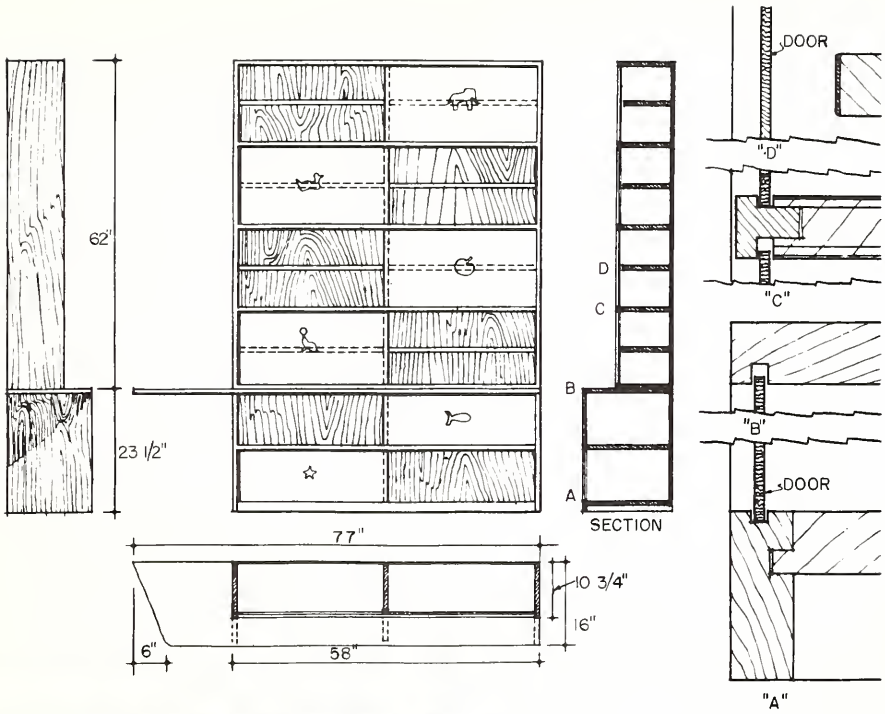





Figure 7–17 Sliding-door cabinet with jigsaw cut-outs as handles. *Courtesy of American Toy Institute.*

freedom to use thumbtacks, to hang up drawings, pictures, and cutouts, with no damage to the permanent wall. This panel must be one of the softboards which take thumbtacks easily.

A large blackboard is also provided. Prepared blackboards are available, made of ⅛-inch hardboard with a dull black coating. You can produce the same effect with a few coats of dead flat black paint on a similar panel.

The companion unit for the bench is the sliding-door cabinet shown in Figure 7–17. The sliding-door handles are jigsaw cutouts which, besides being decorative, are easily grasped by small fingers.

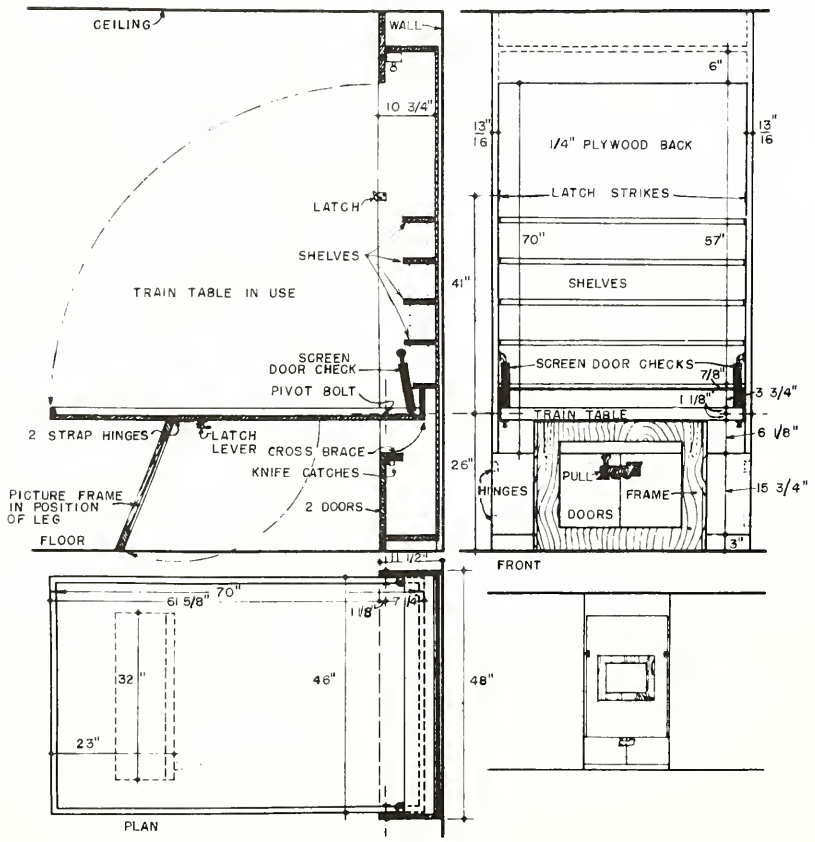
**Fold-away tables for electric trains.** Young railroad men agree that the most satisfactory roadbed is one that is fastened down permanently to some kind of board.

To help absorb noise of trains, glue and nail softboard to plywood to make the table surface. Be sure that foldaway train table illustrated in Figure 7–18 is made



of standard-dimension, commonly available materials and utilizes pneumatic screen closers for smooth, safe operation. Wall storage space, 6 inches deep, makes it possible to put away water towers, switches, and other train accessories, as well as rolling stock and extra track. A drawer at the bottom offers additional storage space for model-railroad enthusiasts. The table, approximately 4 by 6 feet, offers variety in track layout. The stand for the table, when not in use, folds against the wall as an attractive frame for children's pictures. Tack board is used for backing so that pictures may be changed frequently.

Figure **7–18** Foldaway train table showing landscaping and storage of equipment. *Courtesy of American Toy Institute.*



Although the layout area is small, remarkable landscaping effects can be achieved, as shown in the photograph, with a few simple materials. Secure the track permanently to the table by means of screws through the holes in the ties.

Besides being a delight to railroaders, these train tables are easily adaptable for model building and other hobbies and for a variety of games.

**Interchangeable shelf-drawer cabinet.** The cabinet for small-boy operations, shown in Figure 7–19, is 24 inches high. Drawers

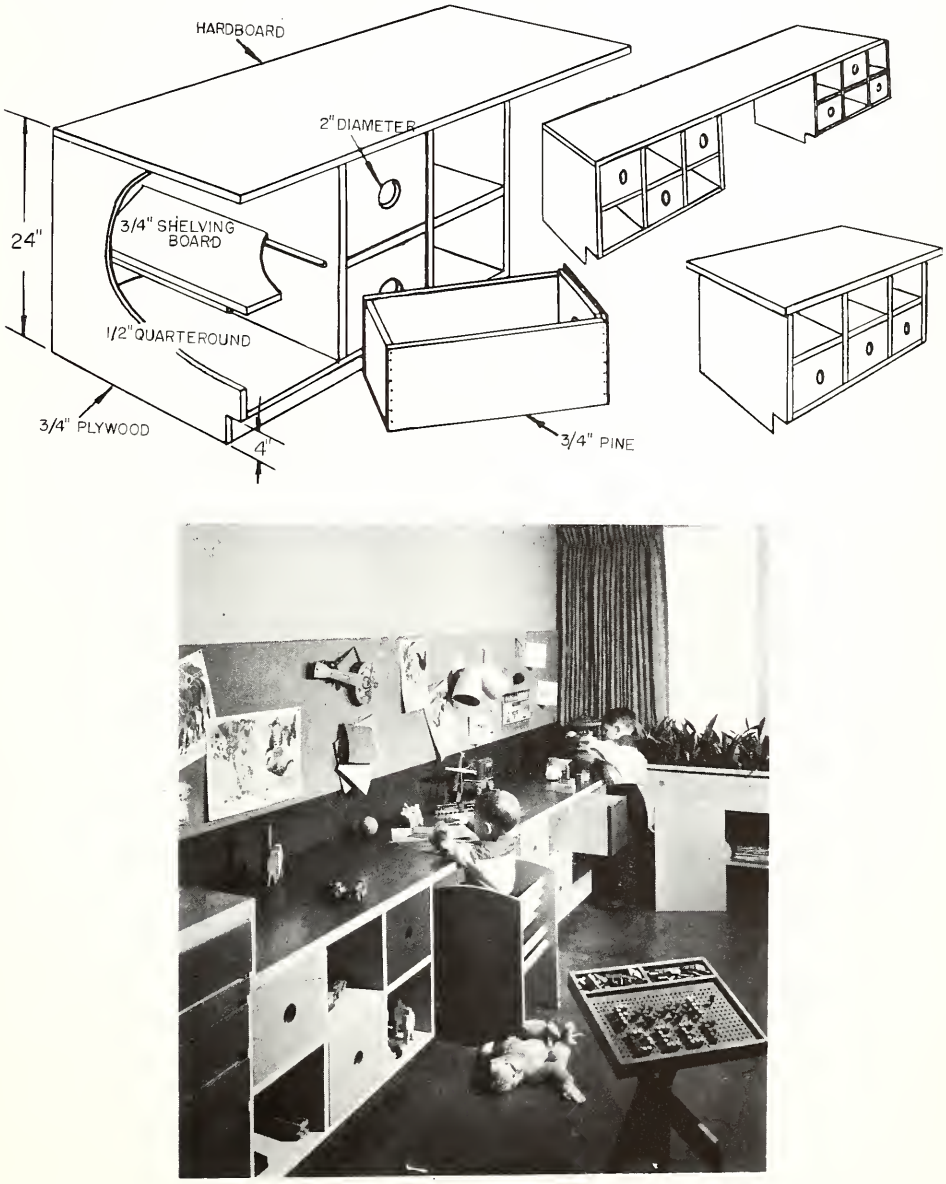



Figure **7–19** Cabinet for small-boy operations, with interchangeable drawers and shelves. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

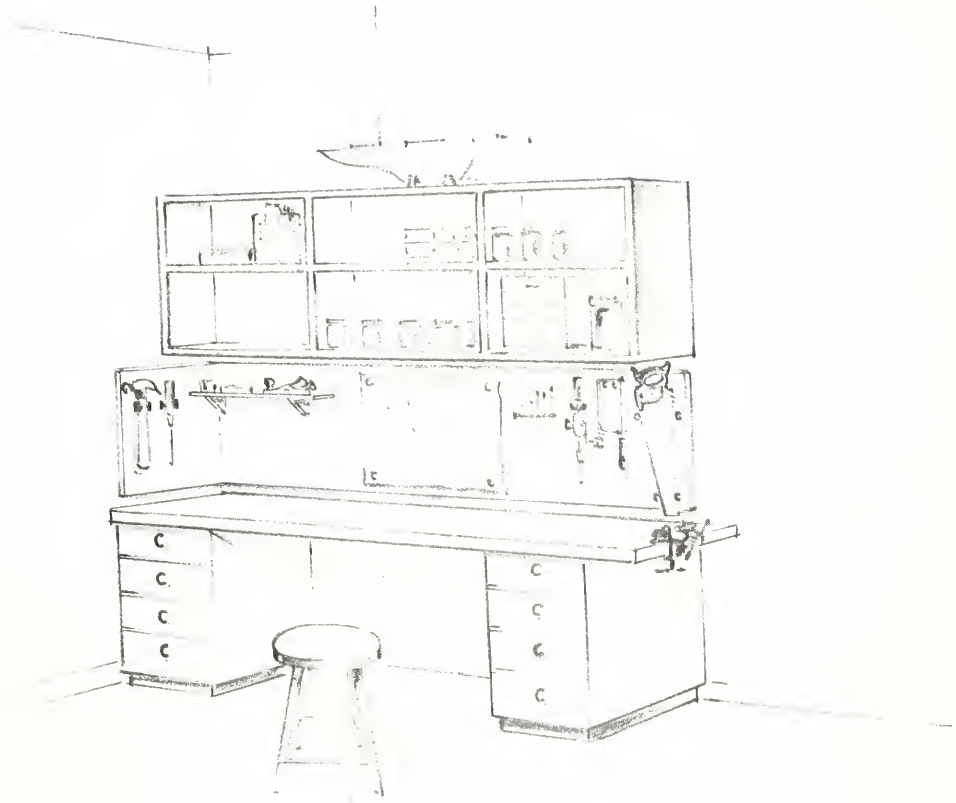


Figure 7–20 Model builder's workbench.

are interchangeable with open sections of cabinet, and more drawers can be added if desired. Open sections are ideal for toy storage. This unit may be built as either a long or short cabinet, the longer counter being useful as desk, drawing board, or game surface.

**Model builder's workbench.** For the young model builder, the workbench shown in Figure 7–20 is ideal. The base for the bench is 2 chests of drawers (page 102), with a top of ¾-inch plastic or of hardwood-covered plywood. The top is held to the base units by means of 3-inch angle brackets. The shelves are 3 storage units (page 45)—with or without doors. The tool panel can be made of ½-inch plywood or wallboard. To protect the floor and make cleaning easier around the bench, put down a sheet of ⅛-inch hardboard, 4 by 8 feet.

# CHAPTER 8

## BATHROOM IMPROVEMENTS

IT IS not many years since the now indispensable bathroom replaced the backyard privy. Recent advances in design and materials have made even the medium-priced fixtures of today superior to the most costly ones manufactured only 20 years ago. However, a great many bathrooms are old-fashioned, inconvenient and inadequate, dilapidated in appearance, and difficult to keep in sanitary condition. In this chapter, ways of remodeling and modernizing such bathrooms are described.

The addition of a second bathroom is a good investment, increasing the livability and probably the salability of a house. A large closet can easily be converted into a small bathroom. An examination of hallways often reveals waste space or a little-used closet under the stairs that can be made into a small powder room with a minimum of additional construction.

**Planning the bathroom.** Whether you are putting in a new bathroom or remodeling an old one, plan to fit your family's present and future needs: Let everyone in the family join in the planning. Here are a few of the many questions you will want to talk over before you make your final plans.

Will Dad and the boys coming in from work or play use the bathroom as a washroom, or can you build a separate washroom? What are the special needs of the children or sick or aged members of the family? Do you need bathroom space to bathe and dress a baby? Will there be a morning rush on the bathroom? Perhaps you need a bathroom that several persons can use at one time and still have privacy. Plan these things carefully in advance, for once fixtures are in, they are not easy to move.

Today's bathrooms are often criticized as being too small. While size is a factor, the trouble lies very often in awkward arrangement of fixtures. A large bathroom, poorly laid out, can be inconvenient, while a moderate-size bathroom with fixtures arranged for easy access can offer maximum efficiency in use.

The plans shown in Figure 8–1 should stimulate your thinking about your own needs and introduce a few new ideas in bathroom layouts. The plumbing fixtures are arranged for economy of installation and maximum utility within the limitations of the individual room. The layouts eliminate waste space and provide sufficient clearance between fixtures. They also illustrate how windows should be placed to give proper light and ventilation.

All cities and most towns have plumbing codes which specify minimum sizes of bathrooms, windows, and drainage piping. The code in your locality must be checked before you start a program of remodeling. Most codes require a window of a specified area unless mechanical ventilation is provided for a water closet. Some cities allow a 3-inch soil stack, but most require 4 inches. Since a 4-inch stack measures

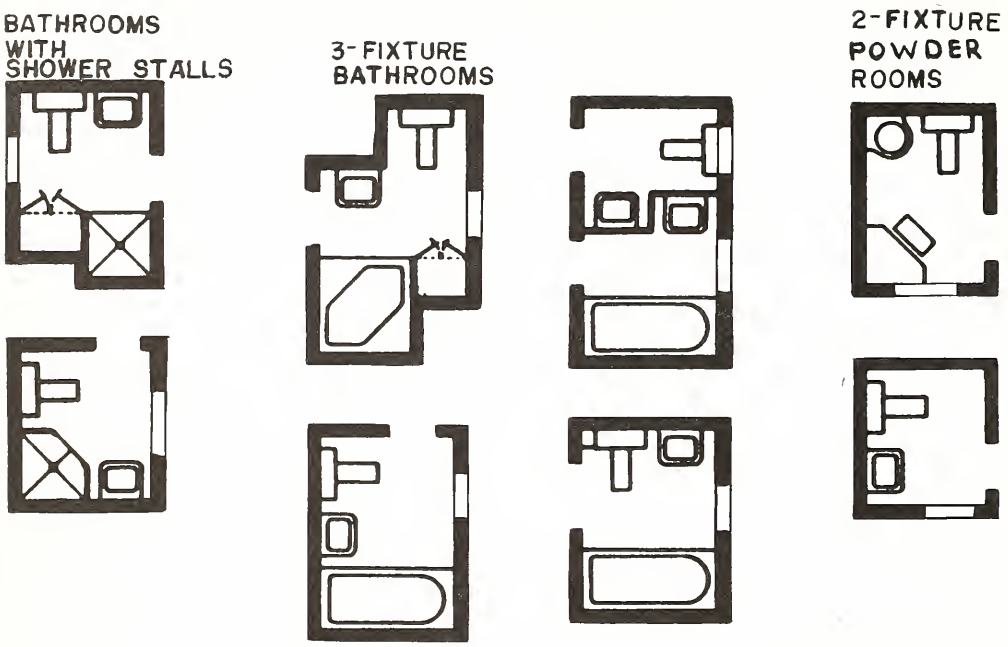



Figure 8–1 Sample bathroom layouts.

6¼ inches over the hub, this makes a difference in the size of the partitions which house the stack. The arrangement of fixtures is affected also by the code requirement as to the distance from the bathtub outlet to the soil stack; this distance varies from 5 to 8 feet. Unless you have plumbing experience, it is best to hire an experienced plumber. However, you need to understand these requirements in order to do your planning and construction work.

In planning bathrooms, the Plumbing and Heating Industries Bureau suggests that the following ideas be considered.

While the bathroom should be placed where it is most convenient, a saving in piping costs can be effected by placing it directly above the kitchen, or, in a 1-story home, back to back with the kitchen.

The recommended size for the family bathroom is 6 by 8 feet, and no bathroom should be less than 5 feet wide. Space between fixtures should be no less than 6 inches. The lavatory, being the most attractive fixture, should be located directly opposite, the opened door, if possible. The toilet should be placed in a secluded part of the room.

The bathroom door should be 28 inches wide and should swing into the room; one that swings out is awkward. (A 24-inch door will do but is often mistaken for a closet door.)

Provide ample space for storing linens, a medicine cabinet with a good-sized mirror, and plenty of light, both artificial and daylight.

Place windows where they are accessible if possible. If not, the next best place is over the toilet; next, over the lavatory. Do not place a bathtub under a window if there is any way to avoid it. When a window is placed over a fixture it must be placed high enough to clear the vent piping. Over lavatories the sill of the window should be approximately 52 inches from the floor.

On remodeling jobs, fixtures should be placed to take advantage of existing stacks and water supply, especially the former; water can be carried easily, especially if copper tubing is used, but changing or offsetting soil stacks is expensive.

The most economical arrangement is to place the 3 fixtures on 1 wall over the first-floor kitchen or bath, or next to the kitchen, so as to use the same drainage piping. The tub may be placed on the wall opposite the toilet and lavatory if the distance is under the plumbing code allowance of from 5 to 8 feet.

Avoid placing fixtures, stacks, or water-supply lines on outside walls. If it is necessary to do so, provide for insulation that will prevent freezing.

**Facts on fixtures.** Today manufacturers of bathroom fixtures are broadening their stock and producing complete lines in a wide variety of distinctive styles and price levels. While no radical innovations in design are noted, the latest models offer the ultimate in convenience and efficiency. The use of flat space on all fixtures is a new practical feature in bathtubs, lavatories, and even toilets.

Strength, durability, and ease of cleaning are factors to consider in selecting fixtures.

A shower either over the tub or in a compartment is automatically included in new homes. For modernization of old houses, special types of showers can be installed without marring the walls. Shower cabinets can be installed in spaces as small as 32 inches square and 72 inches high. The shower head should be mounted high enough to suit the tallest member of your family; some types of head permit the force and direction of the spray to be adjusted.

Lavatories may be wall-hung or set on chromium or glass legs. Towel bars are sometimes an integral part of the legs or are attached to the sides. A recent innovation is the vanity lavatory—a lavatory encased in a cabinet which may be used to store toilet articles.

Regardles of the type of lavatory you choose, it is important to have it at the right height for the members of your family. You can place a wall-hung lavatory at any height. A lavatory with fixed legs or on a pedestal is usually 31 inches high. You can adjust the height of a lavatory with a ready-made cabinet under it by building up the toe space. For small children, provide a movable step stool.

With faucets that mix hot and cold water you can regulate the temperature of the flow. Metal and most plastic faucet handles are less likely to break than porcelain ones.

Because of its hygienic importance the toilet should be selected with the utmost care. The prevention of back siphonage has been given careful attention by designers. Two major improvements in toilets are the quiet-operation feature and single-unit design—tank and seat in 1 piece. The 1-piece toilet is easier to clean and neater than the older 2-piece type with exposed pipes. Seats of plastic or plastic finish wear longer than those of painted wood. There are 3 types of bowls: the siphon jet, the reverse trap, and the washdown. They differ in the size of the water bowl, the trapway, and the depth of seat.

Figure 8–2 shows standard sizes of the usual bathroom fixtures.

When planning and locating fixtures keep in mind the following points.

The tub should be supported on the partition with metal clips or two-by-fours standing on end to prevent settling, which results in an opening between the wall and the tub rim. There is nothing so unsightly in a bathroom as a large crack above the tub, with the crumbling remains of the last attempt to fill the opening.

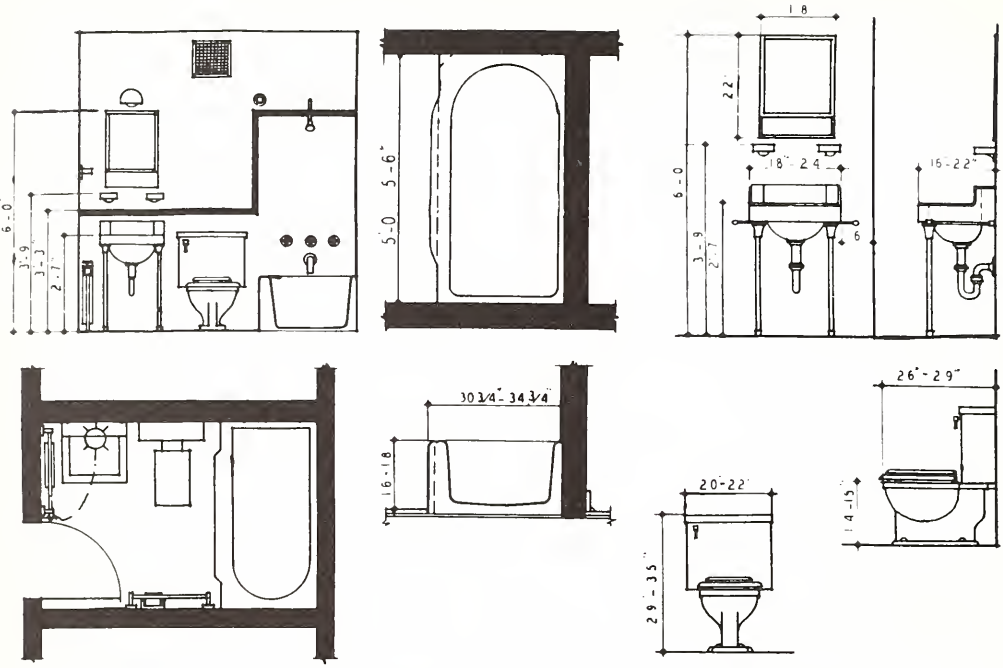



Figure **8–2** Standard sizes of bathroom fixtures. *Reprinted from* Practical Builder.

Bath tubs are drained through a drum trap; the top of the trap is removable, and it must be accessible for cleaning or repair.

The shower should be large enough and curtained or glass-enclosed to prevent undue splashing. Splashing is also the main consideration in locating a shower. Water splashing onto a bathroom floor is not only unsightly but dangerous.

The lavatory may overlap the tub end some 3 to 4 inches. Allow a minimum of 18 inches of clear space in front; 14 inches is the customary minimum dimension from the center of the toilet to the edge of the lavatory.

The location of the toilet is limited by the stock lengths of the closet bends (the pipe that connects the closet to the stack); these are provided in lengths of 12, 14, 18, and 24 inches. The maximum distance is 24 inches from the center of the toilet outlet to the center of the stack. The usual roughing-in dimension is 15 inches from the wall. The lip of a toilet projects approximately 30 inches from the wall. There have been some amusing and some irritating instances where this dimension was disregarded, even by professionals, in placing doors and radiators. A clear space of at least 18 inches should be allowed in front of the toilet. In many new plans the toilet is placed in a separate room adjoining the bathroom.

**Wall and floor treatment.** A wealth of materials for floors and walls is now available, with a large number of patterns in a wide range of color. The materials offer unlimited possibilities for individual expression. They include patterned wallpapers finished with washable plastic, various types of linoleums, asphalt and rubber tiles, ceramics, structural glass, and mirrors.

A combination of materials for floor and wall surfaces may be used with perfect freedom. In the majority of cases

such combinations are preferred. They tend to lighten the appearance of the room, and are a distinct departure from the old antiseptic look in bathroom decoration. One successful method is to employ glazed materials, impervious to water, around the tub, shower, and lavatory, with materials of a softer texture on the remainder of the walls. This avoids the hard, metallic appearance that often occurs with use of only one material.

If you wish to use one of the modern covering materials, consider carefully the cost, ease of installation, how long the material will wear, and whether it is easy to take care of. Cost of the materials may vary from one part of the country to another. Check your local dealers to find coverings that suit your taste and pocketbook. Some will last the lifetime of the house; others will have to be replaced. Some materials, as noted, you can install yourself, but be sure to read Chapter 3 and follow the manufacturer's directions exactly. Other materials should be installed by a person skilled in handling them. Local dealers often have factory-trained workmen to install floor and wall coverings, and the quoted prices of floor and wall coverings often include installation.

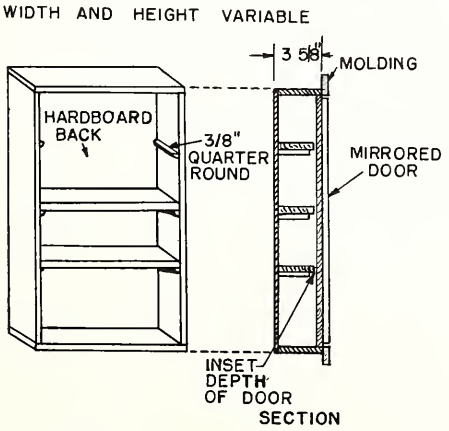



Figure **8–3** Construction of a mirrored cabinet.

For any floor or wall covering, good care is an important factor in how long it will wear. Protect all floors from grease and excess water. Use scouring powder only on unglazed tile. Use varnish, shellac, penetrating seal, and lacquer only on wood.

To clean floors, wash with mild soapsuds, rinse, and dry. Use the type of top finish the manufacturer recommends. Wax (nonskid), often recommended, protects floors and makes them easier to clean. For all walls, washing with water and mild soap, and sometimes polishing, is about all the care they need.

**Cabinets over lavatory.** A cabinet over the lavatory is useful for storing tooth paste, shaving lotion, and other toilet articles; or, if you prefer, you can have a fixed mirror over the lavatory with cabinets on each side. The usual height for such a cabinet is 62 inches from floor to center of cabinet. However, you may find that some other height is more convenient for your family.

Ready-made cabinets are of either the wall-hung or the recessed type, both available in varying sizes. The recessed cabinet most commonly used is 14 inches wide so that it fits between studs. If you want a wider cabinet the studs will probably have to be cut and a simple box framing made (see page 231 for cutting studs).

It is not difficult to construct a cabinet to suit a particular need. The size will often be determined by the mirror available. With a backing of ⅛-inch hardboard a 2-to-3-inch mitered frame can be constructed into which the mirrored door can be hinged, as shown in Figure 8–3.

Shelves of ⅜-inch material can be held in place with quarter round or arranged for raising or lowering as in the case of the bookshelves shown on page 56. Adjustable shelves make the best use of the space in the cabinets, since they allow

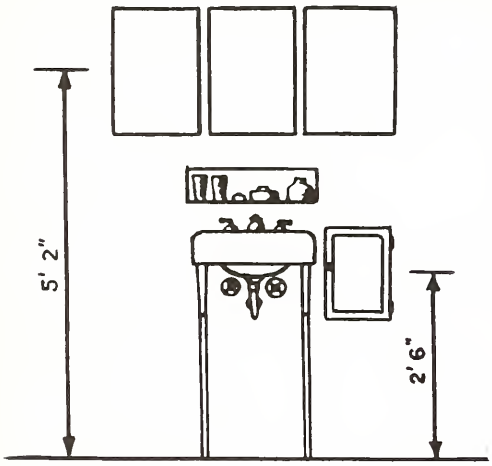



Figure 8–4 Arrangement of cabinets, providing a 3-way mirror over lavatory when side doors are opened.

flexibility in spacing to meet your own special needs. Glass makes good shelving because it cleans easily. If you have wooden shelves, cover them with linoleum or paint to protect them from dampness and toilet preparations.

The mirror is fastened on the door and the door is hinged to the frame. A glass knob or handle and a cupboard catch complete the construction. Finish with white enamel over several undercoats and then nail the cabinet with countersunk finishing nails along both headers directly over the lavatory.

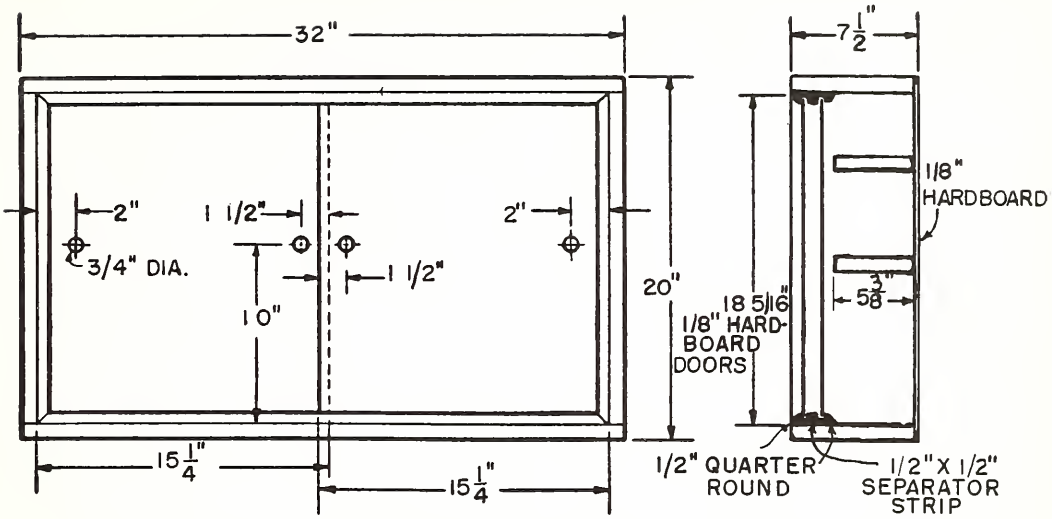
It is easy to keep jars and bottles in order and within reach if you have plenty of shelf space. Figure 8–4 illustrates how you might arrange 3 cabinets over the lavatory. The doors make a 3-way mirror when you open the side cabinets. The figure also shows a low-set cabinet for the children's use, placed so the center is from 30 to 36 inches from the floor. This cabinet gives the children a place to keep their own toilet articles. Later, when they outgrow the cabinet, you can use it to store shoe polish and brushes or other supplies.

A mirrored cabinet or cabinets over the lavatory should be well lighted on both sides. To guard against possible shock, bathroom fixtures should be controlled by wall switches and not by pull chains or key sockets. Fluorescent tubes, which can be installed vertically on either side of the mirror, give excellent modern lighting. At least one double outlet should be installed near the mirror for an electric shaver, curling irons, hair dryer, vibrator, or sunlamp.

**Hanging medicine chest.** As the conventional type of medicine cabinet never seems quite large enough for a family's needs, the hanging chest shown in Figure 8–5 might well be included in your remodeled bathroom. The sides, top, and bottom of the chest are made of ¾-inch stock and the doors are of ⅛-inch hardboard. The chest is made according to details for storage units (page 44).

**Towel cabinets.** Include space for storage of towels in your bathroom, unless you live in a very humid area. Even in a small room you can set a towel cabinet in the wall over the toilet tank (Figure 8–6) if the soil stack or vent pipe is not in the way. Place the cabinet at least 12 inches above the tank. If the wall has 6-inch studs (which is the general rule for the wall behind the toilet), the cabinet can be set back in the wall 5 inches and stand out from the wall even with the front of the tank, or it may be flush as shown. Build the cabinet to the ceiling if extra storage space is required.

Towels can be kept in a cabinet under the lavatory (Figure 8–7) if there is no other place and if moisture does not condense on the pipes. You can build a cabinet as shown or buy one ready-made. The cabinet in Figure 8–7 has a lower drawer with a hinged cover; this makes a handy step for children.



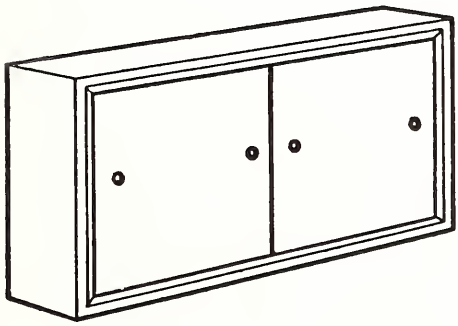



Figure **8–5** Hanging medicine chest with sliding doors. *Courtesy of Douglas Fir Plywood Association.*

sary cleaning supplies in the bathroom. A cabinet under the lavatory (Figure 8–7) or the bottom shelf of a linen closet may be used for this, or a utility cabinet may be set between the studs in the wall at the end of the tub. The space over the toilet

**Clothes hamper.** A cabinet may be built as a "clothes hamper," or container for soiled clothes, as shown in Figure 8–8. Assemble the bottom and sides of the cabinet first (without top and back). Then assemble the "hamper" portion and pivot it as shown in the detail.

**Utility cabinets.** A floor-to-ceiling cabinet provides room for many bathroom supplies. The one shown (Figure 8–9) is 10 to 12 inches deep, and has both open and closed shelves. Make the shelves adjustable in height. If desired the bottom section can be made into a clothes chute or (by installing the hinged section of Figure 8–8) into a laundry hamper.

It is convenient to store the neces-

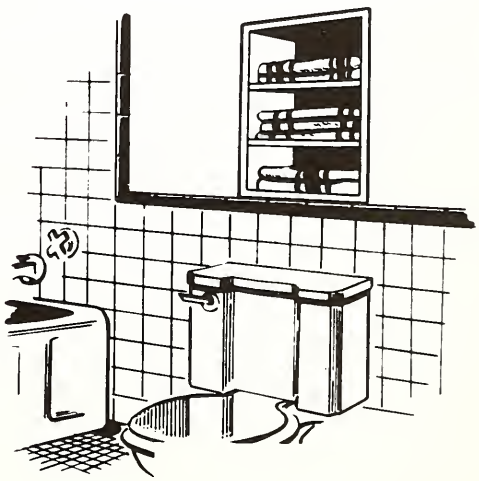


Figure **8–6** Recessed towel cabinet. *Courtesy of Tile Council of America.*

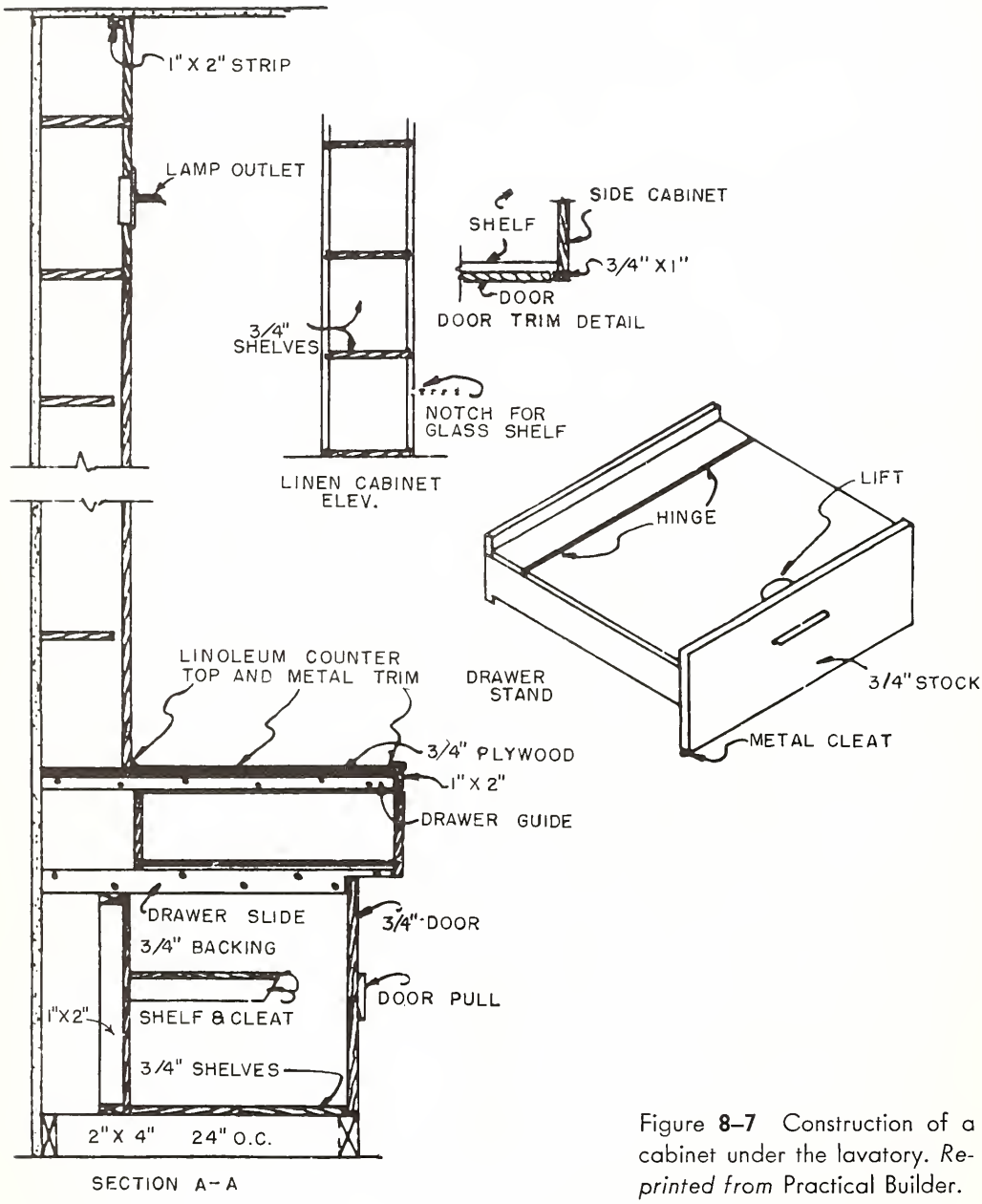
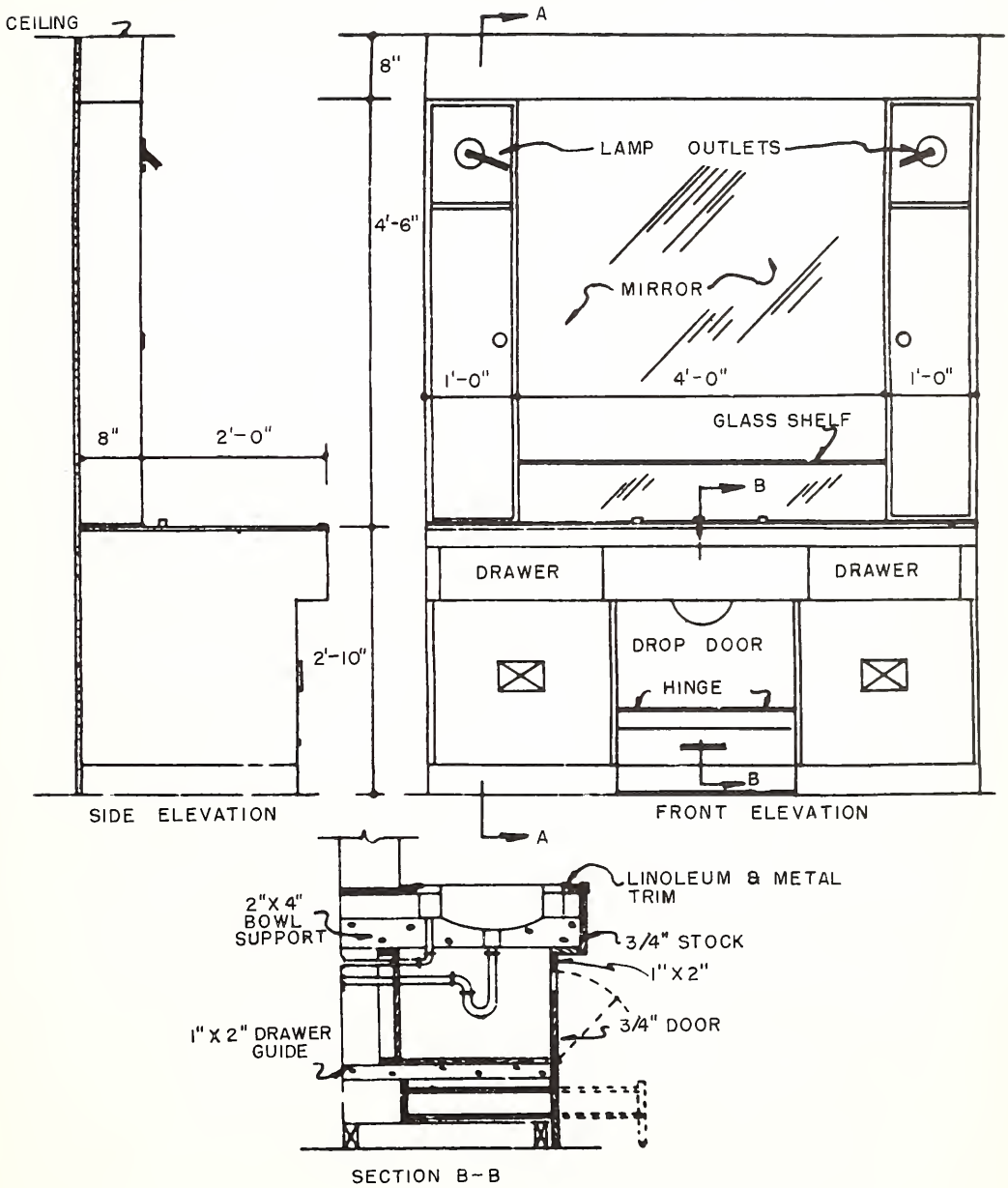



Figure **8–7** Construction of a cabinet under the lavatory. *Reprinted from* Practical Builder.


CEILING
A
8"
4'-6"
LAMP
OUTLETS
MIRROR
1'-0"
4'-0"
1'-0"
GLASS SHELF
B
8"
2'-0"
2'-10"
DRAWER
DRAWER
DROP DOOR
HINGE
B
SIDE ELEVATION
FRONT ELEVATION
A
LINOLEUM & METAL TRIM
2"X 4" BOWL SUPPORT
3/4" STOCK
1"X 2"
3/4" DOOR
1"X 2" DRAWER GUIDE
SECTION B-B

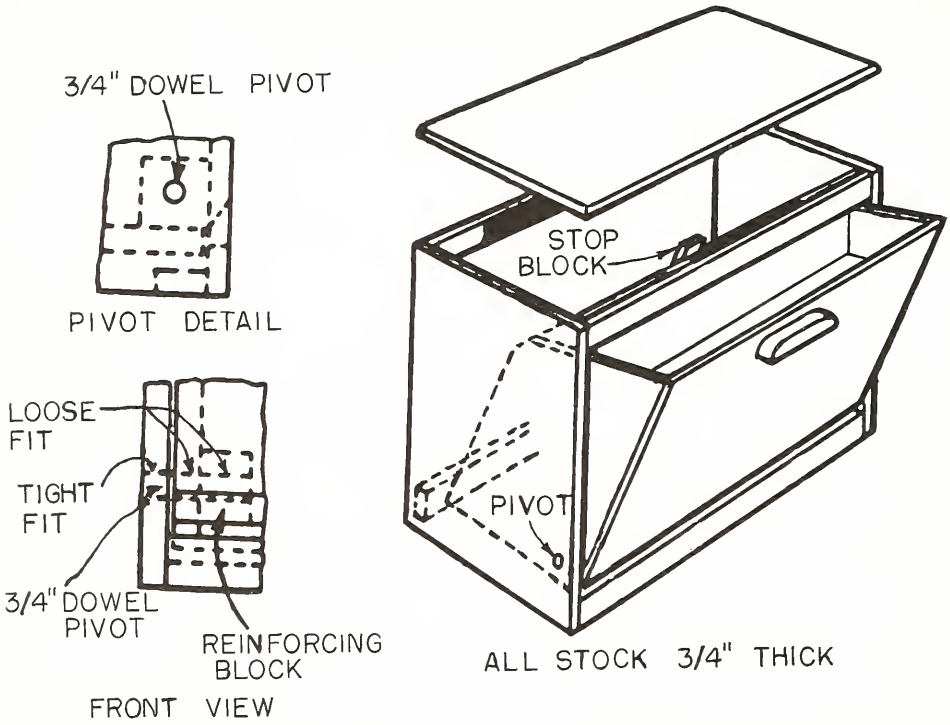



Figure **8–8** Clothes hamper. *Courtesy of Douglas Fir Plywood Association.*

may also be used for this purpose, by building a shallow odds-and-ends cabinet (Figure 8–10) with sliding doors.

**Clothes driers.** If it is necessary to hang wet clothes in the bathroom, the best place is over the tub, where the water can drip and drain away. Here are suggestions for several driers that are handy to use and always ready.

1. Hooks fastened on the wall at each end of a set-in tub to hold lines stretching over the tub (see Figure 8–11).
2. A line on a reel at the end of the tub.
3. A folding rack installed inside the linen or utility cabinet.
4. A swing-arm rack in the lavatory cabinet.
5. A ladder drier at the end of the bathtub (Figure 8–12).

This is made of one-by-threes fastened to the wall, ceiling, and floor. (See Chapter 2 for method of fastening to tile surfaces.) Notice how the rods are staggered to allow wet clothes to hang free. The flat piece at the bottom of the drier slants so that the dripping water runs into the tub. Plastic, wood, or metal may be used for the rods; if you use wood, sandpaper it smooth and give it a waterproof finish.

**Heating.** Remember to plan a place for your radiator, heater, or register. If you have steam or hot-water heat, you can save space by using a radiator recessed under the window. If you plan to buy an electric heater, get a wall-panel or built-in type. Avoid using portable heaters. Place the heater where towels, curtains, or clothing will not catch fire from it, and make sure it is shielded so there is no danger of anyone getting

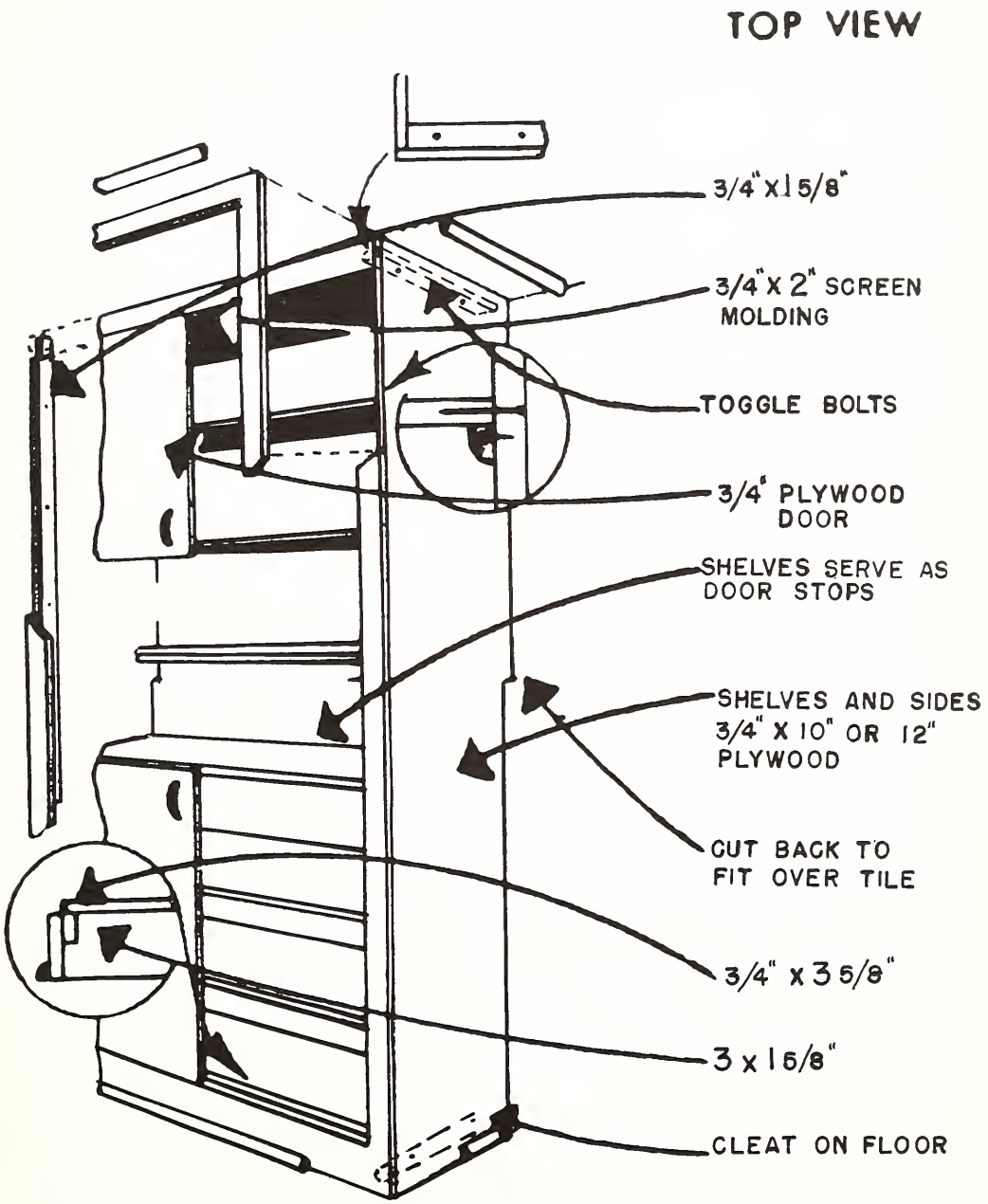



Figure **8–9** Floor-to-ceiling utility cabinet.

## ELEVATIONS AND DETAILS

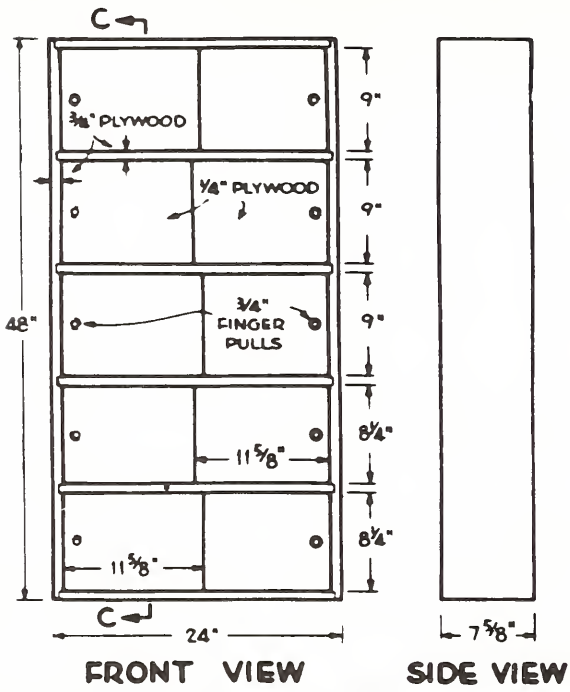
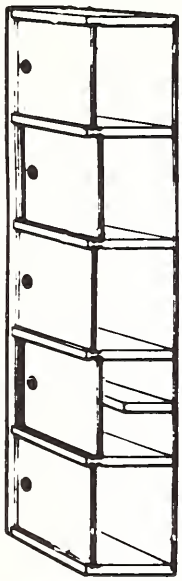
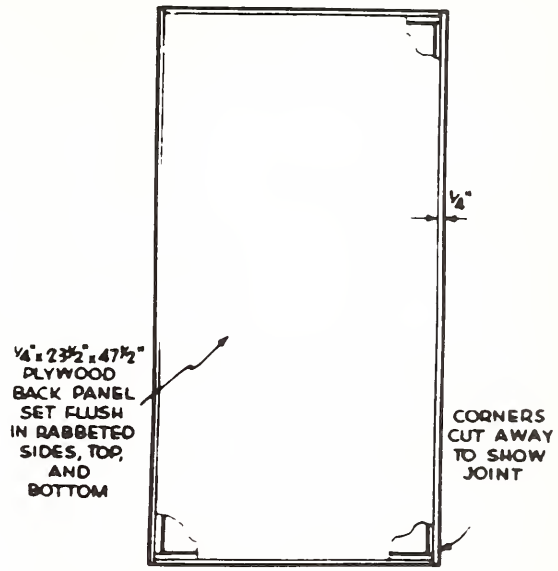




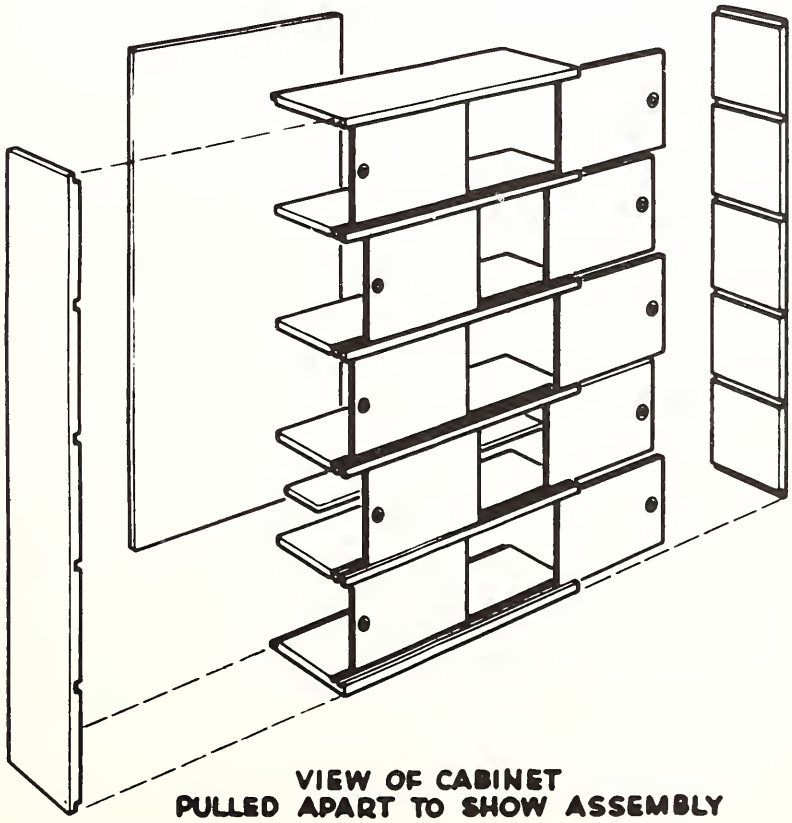

Figure 8–10 Shallow odds-and-ends cabinet. *Courtesy of Douglas Fir Plywood Association.*



SECTION THROUGH C-C




BACK VIEW



VIEW OF CABINET PULLED APART TO SHOW ASSEMBLY

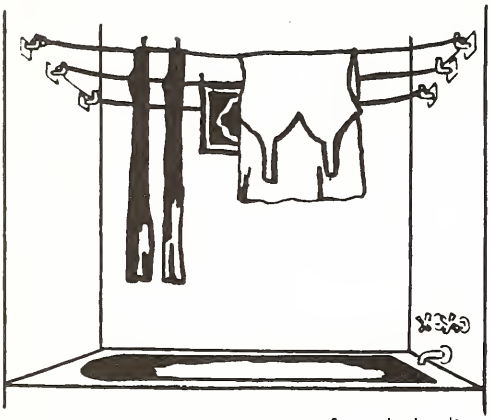


Figure 8–11 Arrangement for clothesline over the tub.

burned. Electric heaters must be properly grounded for safety. Gas heaters should be vented.

**Vanity tables.** Every member of your family will display enthusiasm for a vanity table near the lavatory. Two simple modern designs, in Figures 8–13 and 8–14, are simple counters, with and without legs. An ideal method for supporting the corner next to the lavatory is to bolt it through a hole drilled in the lavatory's apron. If this cannot be done, heavy brackets, either of metal or suitably shaped wood, must be employed; to be effective, they must be located against studs in the wall. A linoleum, tile, or laminated-plastic top, of a color which reflects the decorative scheme, will be most suitable. The edge of the vanity can be concealed by a band of veneer, plastic, or metal. Construction details for vanity tables can be found in Chapters 6 and 7.

**Bathroom accessories.** Accessories improve the appearance and increase the efficiency of the bathroom. Some are "musts" and the others, though optional, make the bathroom more pleasant.

*Towel rods.* Plan enough rods so there is towel space for each member of the family and an extra rod for guest towels. If possible, allow about 21 inches of rod space for each person. If you are short of wall space, install rods on the door or (if there is no shower) above the tub. Place children's towel rods low enough for them to reach. There are inexpensive rods which fasten to the side of a lavatory, and this height is convenient for children.

*Soap dishes.* You will need a soap dish at the tub and one at the lavatory. Be sure the soap dishes drain well and hold even small pieces of soap. There are types available in metal and tile that are set in the wall.

*Toothbrush holders.* Plan a place near the lavatory to keep toothbrushes. The cabinet above the lavatory is satisfactory if it is ventilated.

*Toilet-paper holder.* Set the center of the toilet-paper holder about 23 inches from the floor, within easy reach. If it goes on the side wall, place the holder even with the front of the toilet. Holders come in 2 types, one fastened on the wall, the other set in the wall.

*Grab bars.* Grab bars installed by the

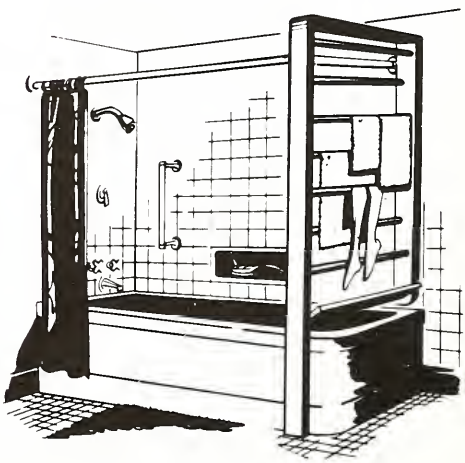


Figure 8–12 Ladder clothes drier. *Courtesy of Tile Council of America.*

bathtub and shower help protect your family from falls. Make sure they are firmly anchored and will hold securely. Generally, for tub and shower, 2 grab bars are used: a long vertical bar for support at the shower end of the tub, and a horizontal bar with the center placed about ⅓ of the length of the tub from the faucets. A horizontal grab bar combined with a soap dish, that sets in the wall, is available in metal or in tile.

*Clothes hooks.* A nonrusting hook on the door or wall is needed for hanging bathrobes and other clothing. For safety, place the hooks above or below eye level.

*Doorstop hook.* A doorstop placed at clothes-hook height will do double duty as a stop and as a clothes hook. (This idea will serve equally well in other parts of the house.)

*Razor-strop hook.* If the men of the family use a straight-edge razor, place a hook for the strop near the lavatory. A good height for the hook is about 4 feet from the floor.

*Sun-lamp holder.* A double robe hook can serve as holder for a portable sun lamp to be used while shaving. The same hook, mounted near the lavatory mirror, can be used for razor strop, bathrobe, pajamas, etc.



Figure **8–13** Built-in bathroom vanity with a ceramic-tile top. *Courtesy of Tile Council of America.*



Figure **8–14** A vanity shelf installed at the end of the tub. *Courtesy of Tile Council of America.*

*Razor-blade slot.* Some ready-built cabinets over the lavatory have an opening in the bottom or back so that used razor blades can be dropped between the studs. If you are building your cabinet make the slot ¼ by 1½ inches.

*Bookshelf.* A built-in book or magazine shelf near the toilet may please your family.

*Clothes-rack drier.* A towel rack mounted near an electric wall heater will dry clothes in a few minutes and eliminates leaving them in the bathroom overnight. The towel rack swings out of the way when not in use.

*Hair drier.* An instantaneous electric heater installed at head level will dry hair in short order and eliminates stooping or bending to be near the source of heat. Powered by an electric fan, the unit is also a quick source of heat.

*Swinging mirror.* Practical as well as decorative, a mirror may be hinged so it can be pulled outward for more convenient shaving or make-up.

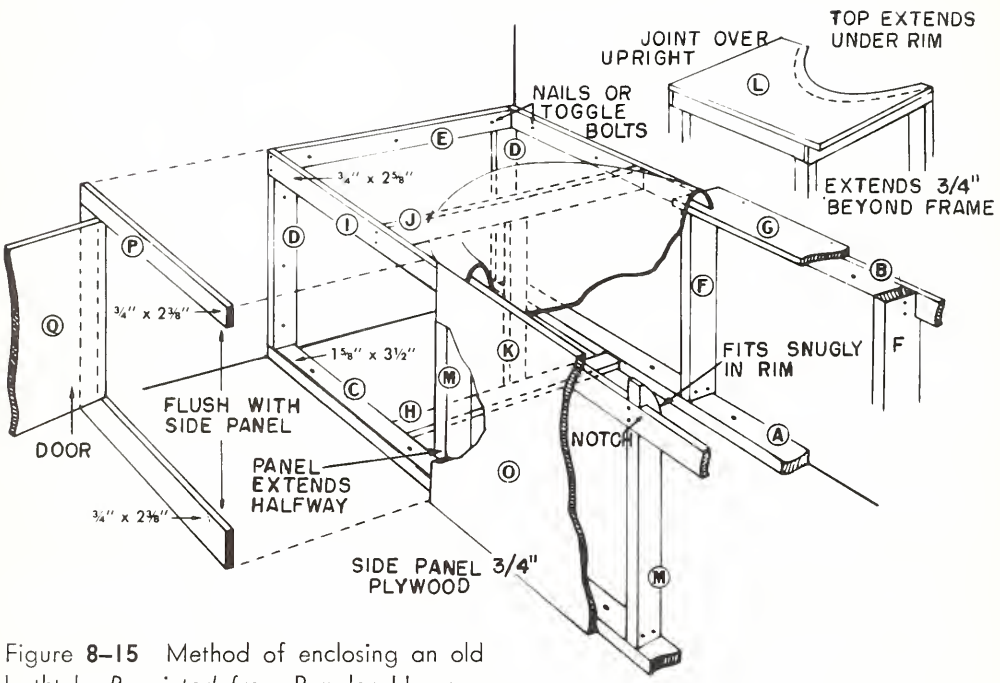



Figure **8–15** Method of enclosing an old bathtub. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

*Ash tray.* A chromium ash tray mounted on the wall beside the lavatory is a convenience and will prevent ashes from being scattered around.

*Paper-towel holder.* A paper-towel holder is especially handy where there are children in the family and it is hard to keep towels clean.

*Odor Sterilamp.* This new lamp destroys odors in kitchens, bathrooms, bedrooms, closets, etc. Ultraviolet rays convert normal oxygen around the lamp into an even stronger oxidizing agent—ozone. A neat functional fixture, containing the small ballast required, houses the odor-killing lamp. A ventilating fan is also useful in the bathroom (See page 74).

**Enclosing an old bathtub.** A tub with ornamental legs makes your bathroom—and your house—look out-of-date. If new fixtures are too much of a strain on your budget, the next best thing is to hide the old tub's silhouette. This can be done with a few simple tools and some framing lumber (1-by-3, 1-by-4, and 2-by-4-inch stock). See Figure 8–15.

First, see that the tub is sitting level; block up the feet with hardwood wedges if necessary. Then, measure exact floor-to-rim height and wall-to-outside-rim width and transfer to walls and floor, rechecking with a level. Mark walls and floor. When this is completed, disconnect the tub and move it well out from the wall. (The tub will be leveled again later.) Remove all base molding.

To make the frame, first cut 2-by-4-inch stringer A and 1-by-4-inch cleat B to proper length. Nail A to floor. Place cleat B against wall exactly ¾ inch below guide marks on wall. Have nails well

started in cleat before leveling. Nail to studs or use toggle bolts. Then, cut stringer C to proper length; bring edge ¾ inch back from floor guide marks and nail to floor. Cut 2-by-4-inch corner posts D, measuring for length between cleat and stringer. Plumb before nailing to the wall. Notch 2-by-4-inch upright F to fit flush against cleat B. Toenail to cleat and stringer. The tub's curvature will determine the length of plate G. Nail it to cleat and uprights. Nail brace H into position. (No brace should be needed at front.)

Now move the tub back into place, lifting it over stringer C. Connect fixtures and level tub. Make all adjustments now. Then cut rail I and braces J and K from 3-inch stock and nail in place. Cut out plywood top L (of exterior-type plywood), allowing 1-inch extension under lip of tub. Cover top L and plate G with linoleum, using linoleum paste. Fill joints with calking compound. Next notch uprights M to fit rail, round off uprights to shape of tub, and toenail to stringer. Nail side panel O (of ¾-inch plywood, extending from front wall to center of upright M) flush with lip of tub. Make 3-sided frame for plywood door Q from 3-inch stock. Upright M and rail I serve as stop. Door opens to handy storage space.

If desired, laminated plastic or decorative hardboard may be used instead of linoleum. If hardboard is used, the door will require more framing.

**Enclosing an old lavatory.** As shown in Figure 8–16, an old-style legless porcelain lavatory can be modernized by enclosing it with a frame and shelves.

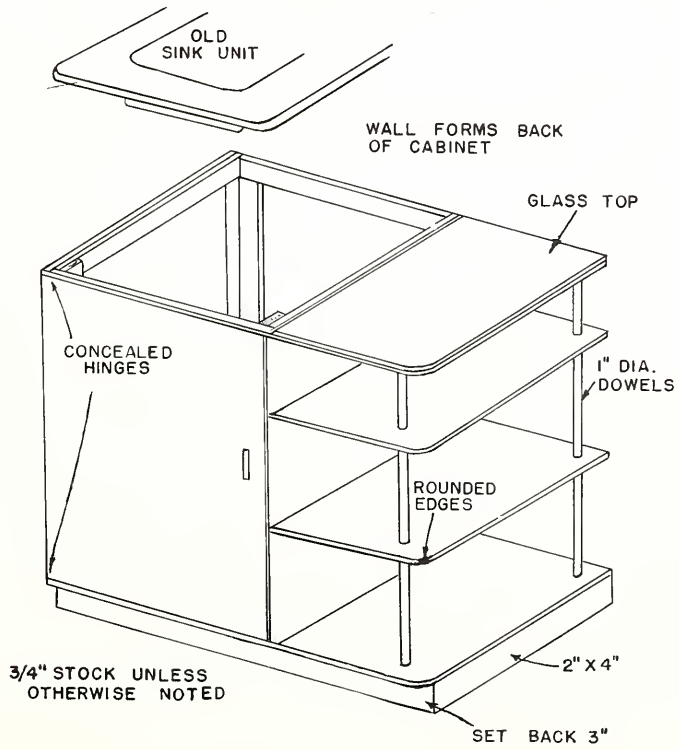



Figure **8–16** Method of enclosing an old lavatory. Laminated plastic or linoleum may be substituted for the glass top. *Courtesy of Douglas Fir Plywood Association.*

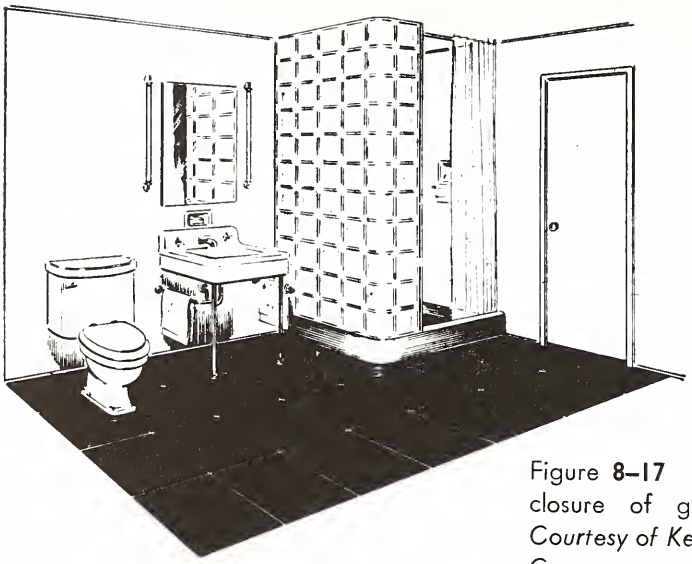


Figure **8–17** Shower enclosure of glass block. *Courtesy of Kemble Glass Company.*

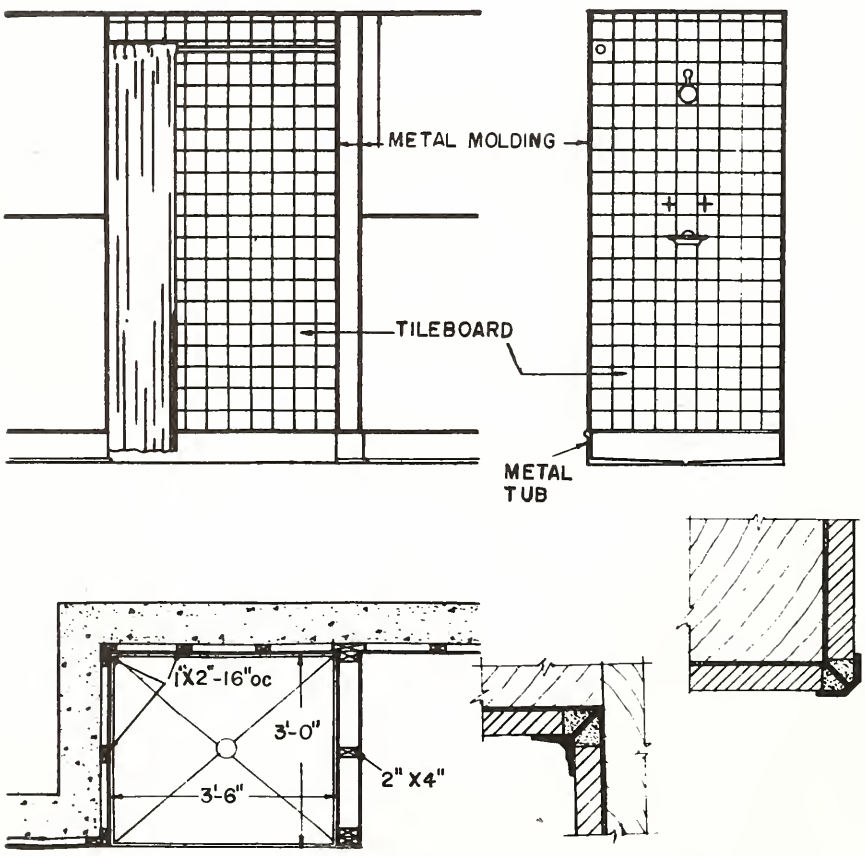



Figure **8–18** Shower enclosure which may be made of wallboard or hardwood. *Courtesy of Masonite Corporation.*

The top shelf can be of laminated plastic or linoleum. If enough space is available, identical shelving can be built on both sides. Metal molding can be added as described on page 81.

**Shower enclosures.** To install a shower enclosure, use a ready-made cabinet or one made from glass block as shown in Figure 8–17, opposite. Most ready-made units come as complete kits with valves, heads, and accessories and are connected to existing piping. All cabinets are installed in accordance with techniques described by the manufacturer. Pipe-size requirements are usually specified by the equipment manufacturer. The amount of pipe and number of fittings required are determined by the location of the cabinet in relation to the existing plumbing circuit. In all installations, however, the local plumbing code must be followed.

You can build your own enclosure of glass block; or you can use hardboard or exterior plywood (see Figure 8–18). The cement shower drain may be purchased from a local masonry dealer. For plumbing details see Chapter 3.

**A model bathroom.** The two sections of Figure 8–19 show a bathroom 9 feet 6 inches square. While it is larger than the average bathroom, the secret of its spaciousness lies in the arrangement of the fixtures and built-ins at an angle to the wall. Its facilities allow the whole family to use it with plenty of storage space for everyone. The arrangement of the plumbing is quite economical. For a remodeling project, where the existing bath may be large, yet not large enough to be divided into 2 separate rooms, this may be the happy solution to the problem of bathroom congestion.

In any event, there are many ideas here that, with slight modifications, could be incorporated into other bathrooms. For example, a handy cabinet for medicine



Figure **8–19** A spacious bathroom with facilities and storage space for the whole family. *Reprinted from* Practical Builder— *American Radiator & Standard Sanitary Corporation.*

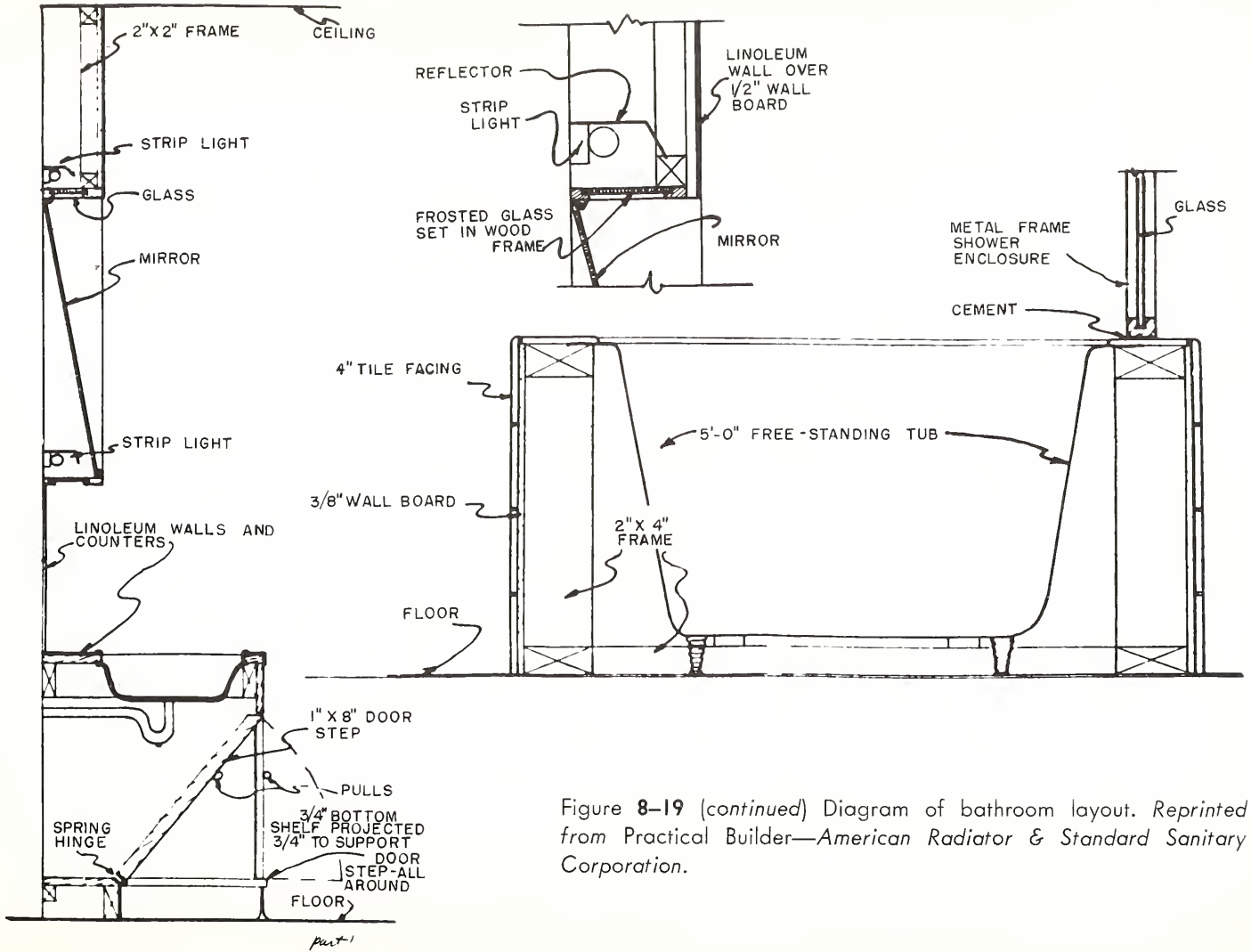



Figure **8–19** (*continued*) Diagram of bathroom layout. *Reprinted from* Practical Builder—*American Radiator & Standard Sanitary Corporation.*

and shaving equipment is placed in the wall instead of in the customary spot behind the mirror. The mirror is tilted back at an angle for convenience while shaving, and the unusual lighting arrangement takes advantage of this angle.

The lower door to the right of the lavatory opens into a clothes chute to the basement or a built-in hamper. The simple, sturdy drop-down steps could be incorporated into any lavatory. A rack for towels and washcloths can be attached to the inside of cabinet doors. The wall cabinet above the toilet is an ideal spot for all extra odds and ends.

The modern folding door next to the toilet is made of blue leatherette and can be closed to give privacy to this portion of the room.

The tile-enclosed tub is another remodeling idea that could be adapted to existing plumbing fixtures.

# CHAPTER 9

## MAKE THE MOST OF YOUR ATTIC

IF you are crowded for space in your home, how about using the attic? In many houses the attic can be converted into 2 large rooms that can be used as extra bedrooms with bath, or into 1 large recreation room. With wall coverings now available, particularly plywood, wallboard, hardboard, and plasterboard, you can do most of the work yourself. After the walls have been framed in, the job is half done because the big sheets of wall material build a solid wall quick; after being nailed in place, they are ready for finishing.

**Planning the attic.** Each attic presents a different situation, depending on the usable area and the pitch of the roof. In general, if the rise of the roof is less than 8 feet, there will be insufficient headroom for a usable room. The minimum standing headroom is considered to be 6 feet 6 inches, and the average person requires 4 feet of headroom when seated. Therefore, the points at which walls 4 feet high will intersect the sloping rafters determine the width of the prospective room. Unless the house is unusually large, a rise less than ⅓ of the span leaves attic space with too little headroom. The length of the room will be dependent upon the length of the house, the placement of the stairs, the location of any interior chimneys, or any other obstruction.

If the attic is small, or only 1 room is to be finished off, the problem is relatively easy; the plan generally depends upon the location of the stairway. Where space exists for 2 or more rooms, preliminary measurements of the available area should be made into a rough floor plan so that you can visualize just how the location of the stairway will influence the arrangement of the rooms. In many houses the attic stairs are centrally located, providing an ideal layout with rooms opening from a small central hall. Where the stairway enters the attic at one end, generally there is not sufficient headroom available for a lateral hallway, and the floor plan must permit entry into a living or general-purpose room first, with the bedroom at the opposite end.

Your procedure depends first on the attic—whether it is long and rectangular under a low-pitched gable roof or whether it is more nearly square with a high-pitched roof. Because of the limited height available in relation to the over-all size in the smaller home, it may be necessary to include the entire attic space along the length and slant a portion of the walls along one or both sides. The alternative is the installation of dormers such as are shown in Figure 9–1. However, unless the attic is already completely floored, subflooring comes first, as the dormer sills are placed on top of the subfloor.

**Subflooring.** You may use ⅝-inch plywood sheathing or 1-by-6-inch boards nailed either at right angles or diagonally across the joists. In good building practice 6-inch diagonal boards are nailed to

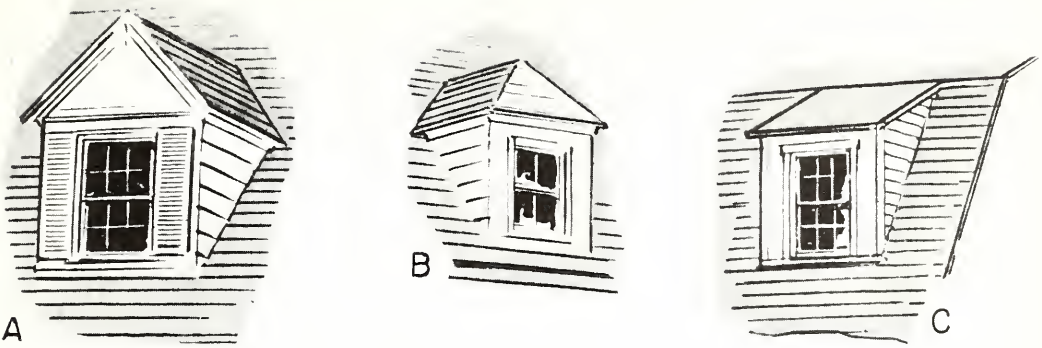



Figure 9–1 Three basic types of dormers.

each joist with two 8*d* common nails. Subflooring is usually covered with a layer of waterproof and sound-resistant building paper. Before applying the subflooring, make the necessary provisions for lighting, heating, and plumbing if cables, ducts, or pipes are to run under the floor. During the laying of the subflooring, care should be taken not to hammer too hard since the vibrations in the floor joists might loosen or crack the ceiling below.

**Dormer windows.** Dormer windows not only increase available headroom in attic rooms, but may be necessary to provide the proper ventilation and light. Unless the house is so located that one side of the sloping roof faces to the rear, 2 dormers are usually needed to balance each other in appearance. For widths over 8 feet the shed or Dutch type of dormer should be used. Shed dormers, because of their greater width, offer a maximum of headroom and light.

Unless you are familiar with the type of carpentry required to frame a dormer, it is a good idea to have this part of the job done by an experienced carpenter. As soon as the dormer is enclosed you can take over and finish the job.

After deciding on the location of the dormer, mark off its area by driving 2 long nails through the roof from the inside. Place these nails at "ceiling" height on the inner side of the 2 rafters between which the window will be located. On the roof, remove all shingles from the markers down to the eaves, and to about 1 foot on the outside of the markers. Then saw out the roof boards in a straight line from mark to eaves. Pry the cut-out boards from the rafters, and the opening is begun. All that remains is to cut through the rafters that are in the way.

First put in double studs or corner posts, as shown in Figure 9–2, under the 2 rafters that form the outside width dimensions of the dormer. Then, making cuts across the intervening rafters, remove them. Once the cut is made, the rafter can be easily pried up from the plate. Nail a timber or "header" across the cut ends of the rafters (using a timber of the same dimensions as the rafters) supported by the double studs. Your opening is now complete.

Framing is simple. Toenail the corner posts onto the plate, or sill. Next, nail a two-by-four across the lower edge of the header you nailed to the cut ends of the rafters, and on this seat fit the new dormer rafters, extending them outward to the new plate nailed across the corner posts.

From this point on, the framing must fit the type of dormer you have chosen.

The *shed dormer* (Figure 9–2) requires only a series of new rafters from double header to plate, spaced 16 inches on

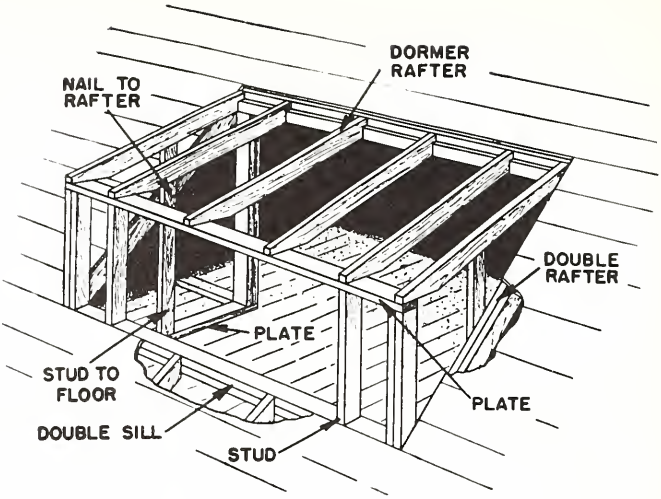



Figure **9–2** Construction of shed dormer. *Reprinted from* Home Guide to Repair, Upkeep, and Remodeling, *by William Crouse, McGraw-Hill Book Company, Inc.*

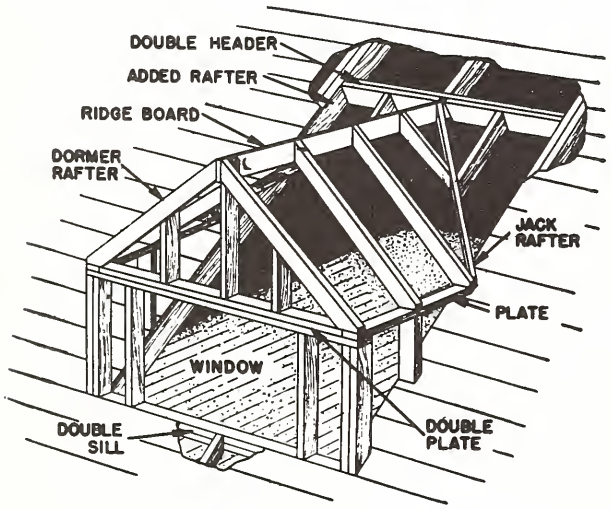
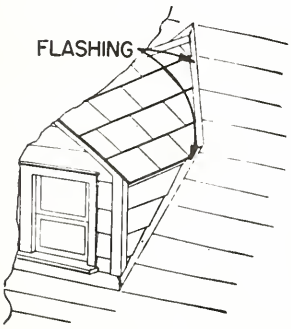
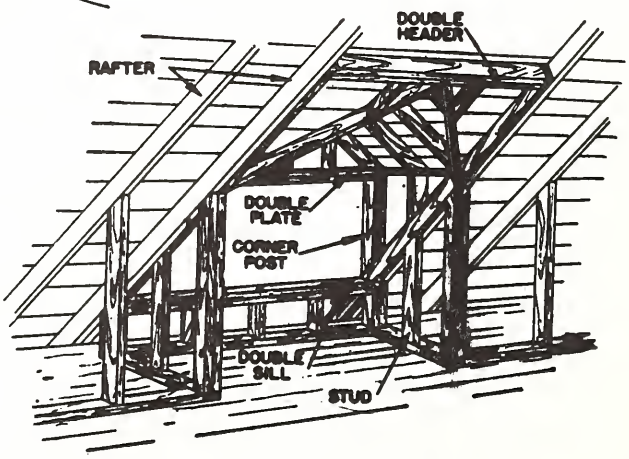



Figure **9–3** Construction of gable dormer. *Reprinted from* Home Guide to Repair, Upkeep, and Remodeling, *by William Crouse, McGraw-Hill Book Company, Inc.*



center from the corner post to the inside double stud, all of these being angled to fit under the framing rafter.

The *gable dormer* (Figure 9–3) requires a plate on 3 sides—across the outer corner posts, and from the outer to the inner posts. On this platform the gable timbers are erected. In most cases, 2-by-4-inch timbers will serve here as the roof areas are all quite small.

The *hip dormer* (Figure 9–4) generally allows the use of taller windows than either gable or shed type and extends farther back into the house roof, providing extensive headroom in depth. The collar beams or ceiling joists should be located so as to align the ceiling of the dormer with that of the room.

The next step is to frame the window and box-in the dormer, covering all sides, including the roof, with tongue-and-groove siding or sheets of exterior-grade plywood. Building the frame to fit a window of standard size will save trouble.

Before the exterior is completed, it is best to put flashing all around the dormer. By using relatively small sheets of copper flashing and starting at the bottom, the necessary 2-inch overlap will be easy to achieve. The minimum of 8 inches on roof and on side walls must be observed; 12 inches gives added assurance of a watertight job. On a gable dormer the flashing is carried right up to the peak where it joins the main roof; the flashing is slipped under existing shingles.

For the sake of appearance, try to match the old shingles and the siding materials. In both cases, a layer of siding tar paper or felt is applied beneath the exterior materials. Installing the window, adding shutters to match others on the house, and applying the necessary coats of paint complete the exterior work.

Figure 9–5 shows a method of making a shed dormer without tampering with the roof rafters. Steel basement sash is used for windows in this dormer.

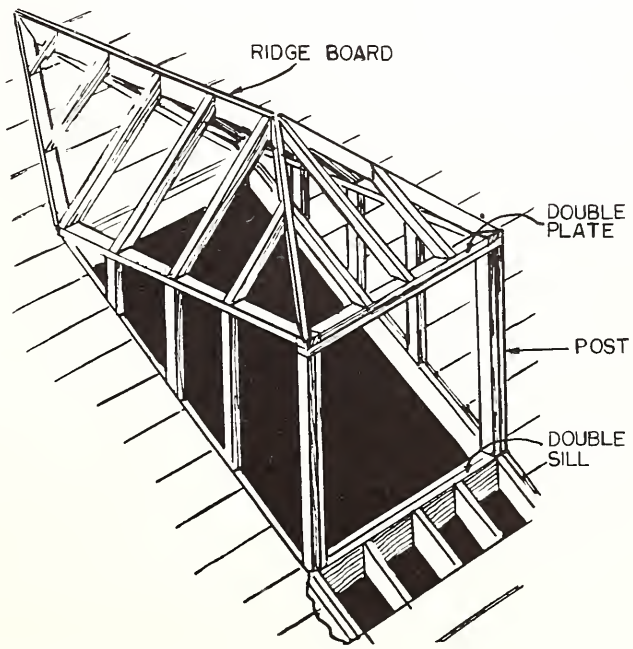



Figure **9–4** Construction of hip dormer.

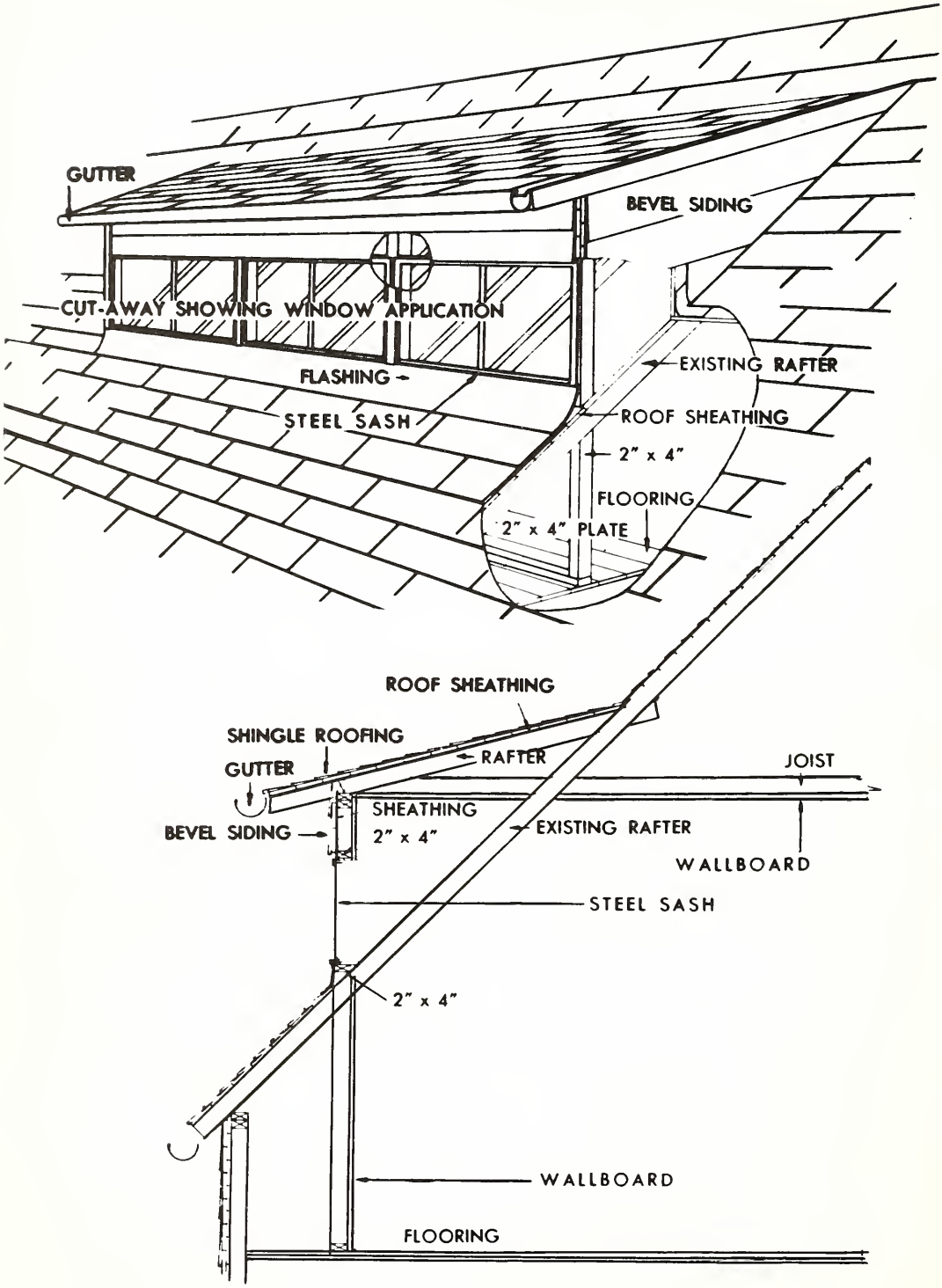



Figure 9–5 Method of making a shed dormer without disturbing the roof rafters. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

**Framing walls and ceiling.** With the dormer framed and the subfloor laid, you are now ready to tackle the job of framing the walls and partitions (Figure 9–6). After determining the perpendicular height of the side wall, mark the floor with a line drawn along a straight edge or snapped with a chalk line. The 2-by-4-inch plate is placed to the rear of, and along, this line; fasten it in position temporarily with a couple of nails partly driven in. Square the lower end of a two-by-four and cut it so that it is a couple of inches longer than the wall studs will be. Put the two-by-four on the plate and hold it vertically so that its upper end rests against the side of the rafter. Check with a carpenter level to be sure it is plumb and then carefully mark along the two-by-four, using the rafter as a guide, to get the angle at which it must be cut off to make the stud. Now saw off the waste and check to be sure that it fits. Some studs may have to be somewhat longer than others in order to keep the wall straight.

When all studs are cut, take one of them and hold it in a vertical position under each rafter in turn with the lower end resting on the plate. Then mark the stud positions on the plate and the plate position on the floor. Take the plate up, and nail through it into the lower ends of the studs to attach them to the plate. After all studs are nailed on, return the plate to position, and nail it down. (The studs may be toenailed to the plate, but this does not have the holding power of the method described.) Then toenail the upper ends of the studs to the rafters.

The next perpendicular measurements will establish the limits of standing headroom. This is marked on the rafters on both sides of the room to determine the location of the horizontal ceiling joists or collar beams, which support the ceiling proper. The ceiling joists can be made with two-by-fours provided the span is not excessive. They can be nailed to the sides of the rafters; or, if it is necessary for them to line up with the wall studs and rafters in order to keep wall joints in

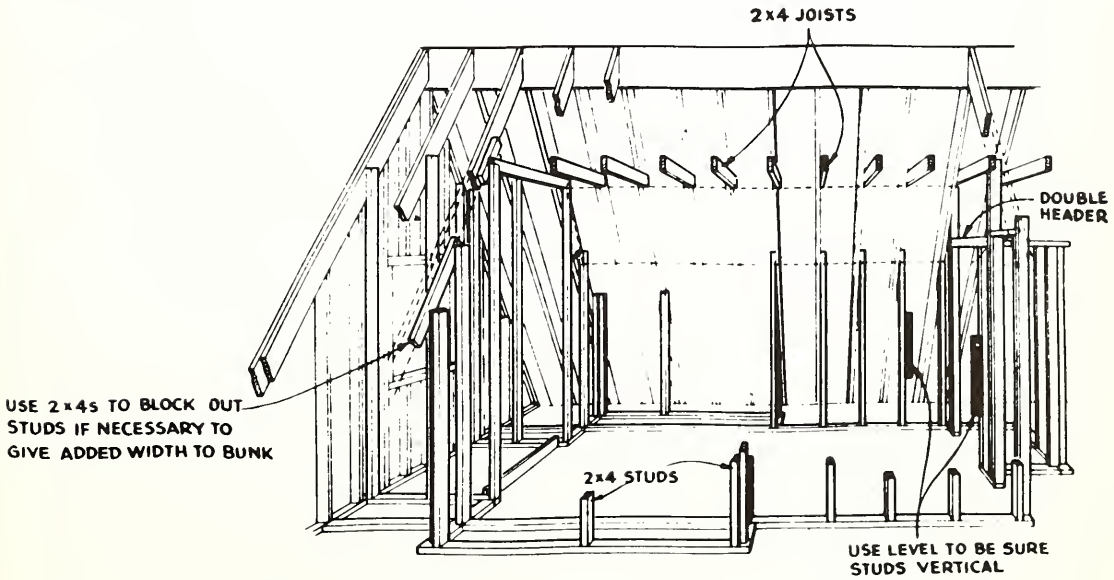



Figure **9–6.** Typical layout and framing for an attic room. *Courtesy of Skil Corporation.*

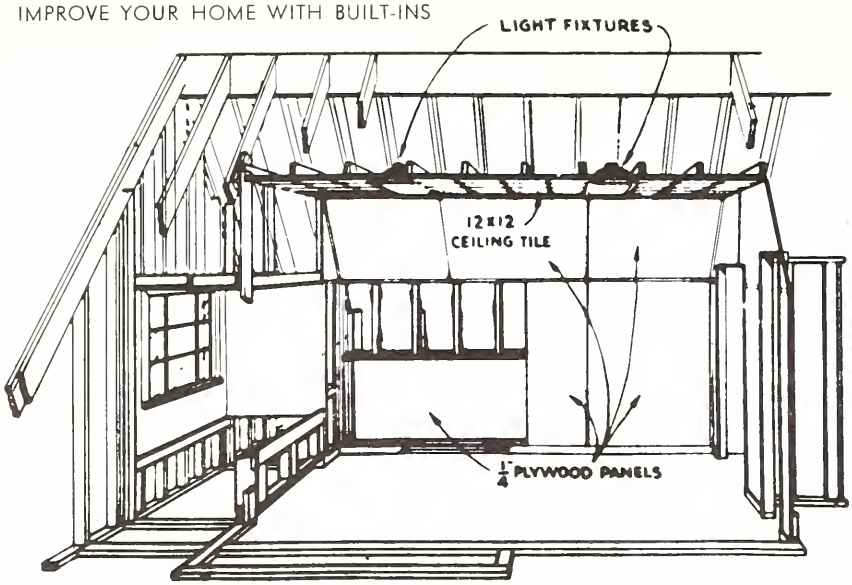



Figure 9–7 Typical wall and ceiling construction for an attic room. *Courtesy of Skil Corporation.*

alignment, they may be toenailed to the rafters with supporting boards or cleats, then nailed to the sides of the rafters and joists. The main difficulty in putting the joists in place is to keep them properly aligned and at the same height from the floor.

A typical wall and ceiling construction is shown in Figure 9–7.

**Installing partitions.** Installing interior partitions is very much like installing wall studs. They can be erected with studs on 24-inch centers; two-by-fours are preferable, with double studding around doors. The first step is to cut the lower plate and the partition studs to length, and nail through the plate into the studs. This assembly is put into place on the floor and the lower plate is nailed down. Then the studs are toenailed into the collar beams.

Interior corners, where a partition is butted up against a side wall, require an additional stud (or studs) as a nailing surface for the edge of the corner sheet of wall material. Full-length partition framing should include wood bridges or blocks between studs at chair-rail height to ensure rigidity. Extra bridges or blocking are added to the sides of door framing to prevent vibration when doors are slammed.

**Heating.** Provision for heating attic rooms varies according to the type of heating system. Generally most home-heating systems will carry up to 50 per cent additional load. It should, therefore, be no great problem to extend the heating system into the newly finished rooms, except that in the case of a hot-water system equipped with a hot-water expansion tank in the attic, the tank will have to be raised above the radiator level.

If the heating system is hot-water or steam, pipes must be run through the walls to the radiators in the attic. Built-in radiators should be backed by a tin or asbestos sheet, concave at the top to throw the heat forward.

If your heat comes from a warm-air

furnace, new ducts must be run and registers installed. The ducts should be rectangular in cross section so that they can be installed between wall studs on the lower floor to reach the attic. There, they can be run between the floor joists to reach the desired register positions. You may wish to call in a professional heating man or tinsmith to install the air ducts.

Auxiliary heaters are sometimes easier to install and cheaper than using your regular heating source. There are many types, portable or built-in, operated by electricity, oil, and gas.

**Bathroom and plumbing.** Your plans may call for a bathroom in the attic. It is best to call in a professional plumber to do the job, unless you have adequate tools, time, and experience to do it yourself. Usually the bathroom will be more economical if located above the bathroom on the floor below so that the same sewer vent can be used. This also permits taking the pipes between studs up to the attic without taking them through studs or joists. When this is impossible, a major installation job is in prospect, since a new sewer line, vent, and water pipes must be run from the basement to the attic, which means tearing out plaster and lath on floors below. Newer houses with "expansion attics" often have the plumbing roughed in, ready for the installation of fixtures. For complete details on planning a bathroom see Chapter 8.

**Lighting.** Prior to insulating and closing in the walls, all electrical wiring should be completed. The lighting requirements generally will be the same as in any other room, plus a stairway hall light. This stairway light should be controlled by two 3-way switches, which will permit the lights to be turned on and off at either the head or foot of the stairs.

**Insulation.** Insulating your attic will do a lot to give your home an even temperature both in summer and winter. In the whole house, the attic is the spot most vulnerable to loss of heat and to the sun's rays, and insulation there gives the highest return in comfort for dollars spent.

Insulation generally comes in 3 forms: as blankets or continuous rolls contained in waterproof paper; as batts 16 inches wide and 24 or 48 inches long, similarly covered; and as a loose fill in bags. For ceiling or roof, 4 inches of insulation is considered the standard thickness.

For the roof and ceiling installation, the batts or blankets are tacked or stapled between the rafters and collar beams by means of strips of paper provided along each edge for that purpose. The insulation should be located toward the bottom edge of the rafters to ensure an air space between the joists or rafters.

Accordion-type insulation, a paper honeycomb with 3 layers of aluminum foil, is light to handle and easy to install. One side of the insulation is stapled along

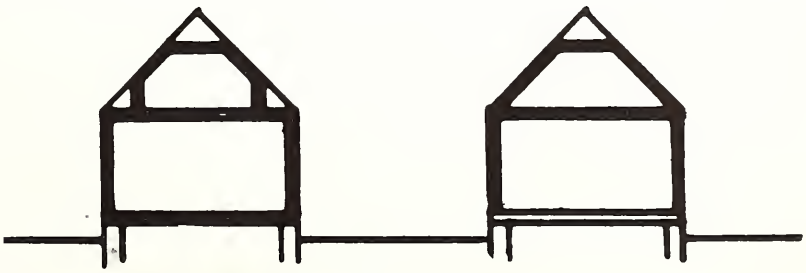


Figure **9–8** Ways of applying attic insulation.



Figure 9–9 Arrangement and types of attic louvers.

a rafter. Then the accordion pleats are pulled open and the taut material is stapled by its other edge to the next rafter.

There are 2 basic ways of applying insulation to an attic room, as shown in Figure 9–8. One is to apply insulation between the collar beams and all the way down the rafters. The other method is to apply insulation between the collar beams, down the short run of the rafters, and then down the studs.

If the walls and ceiling are to be covered with insulating board, it may not be considered necessary to use insulation behind it. However, the best possible protection will be obtained if both insulating board and insulation are used.

Ventilation should never be omitted when insulation is installed. In hot weather, it prevents excessively high temperatures; in cold weather, it allows water vapor to escape, thereby reducing the possibility of condensation. Attic louvers should be placed as high as possible, and should be big enough to give at least 30 square inches of vent area for each 100 square feet of attic floor, distributed in at least 2 louvers. It is advisable to cover the openings. If you use wire screening, to keep out birds and leaves, increase your vent area by 20 per cent; if you use mosquito netting, increase the vent area by 50 per cent. These are minimum figures; larger openings are better. Arrangement and types of louvers are shown in Figure 9–9.

**Finishing.** A hardwood floor may be nailed into place on top of the subfloor after the building paper is laid, or you may prefer to use linoleum or asphalt tile. If the underfloor is rough, sheets of ¼-inch plywood or hardboard will serve as an excellent base for either linoleum or asphalt tiles. The walls and ceiling can be finished with a variety of materials and with different decorative treatments. For installation of floors, walls, and ceilings, see Chapter 3.

Finishing up the dormer will depend on the type. The shed dormer requires a ceiling applied to the underside of the rafters. For a flat ceiling in a gable or hip dormer, you will have to put cross members between the studs, resting on the side plates, to which the ceiling material can be fastened. A peaked ceiling is rarely used.

**Two model attics.** Figure 9–10 and Figure 9–16 show attics which have been made into extra rooms. The first (Figure 9–10) is a general-purpose room which includes a desk, a bunk with storage unit above it, an end-and-side storage unit utilizing space under the rafters, and a closet with a door. Figures 9–11 to 9–15 show, step by step, how to go about building these units. Since attics vary in shape and size, most dimensions have been omitted; these will be determined by your

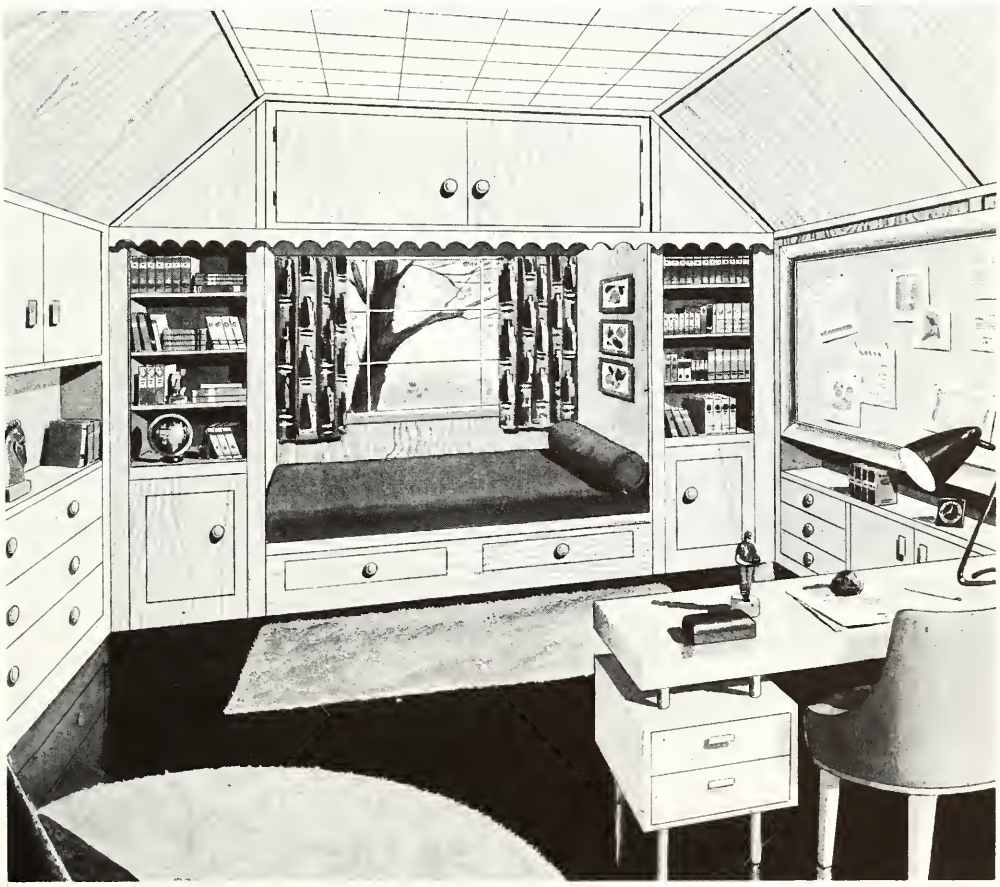
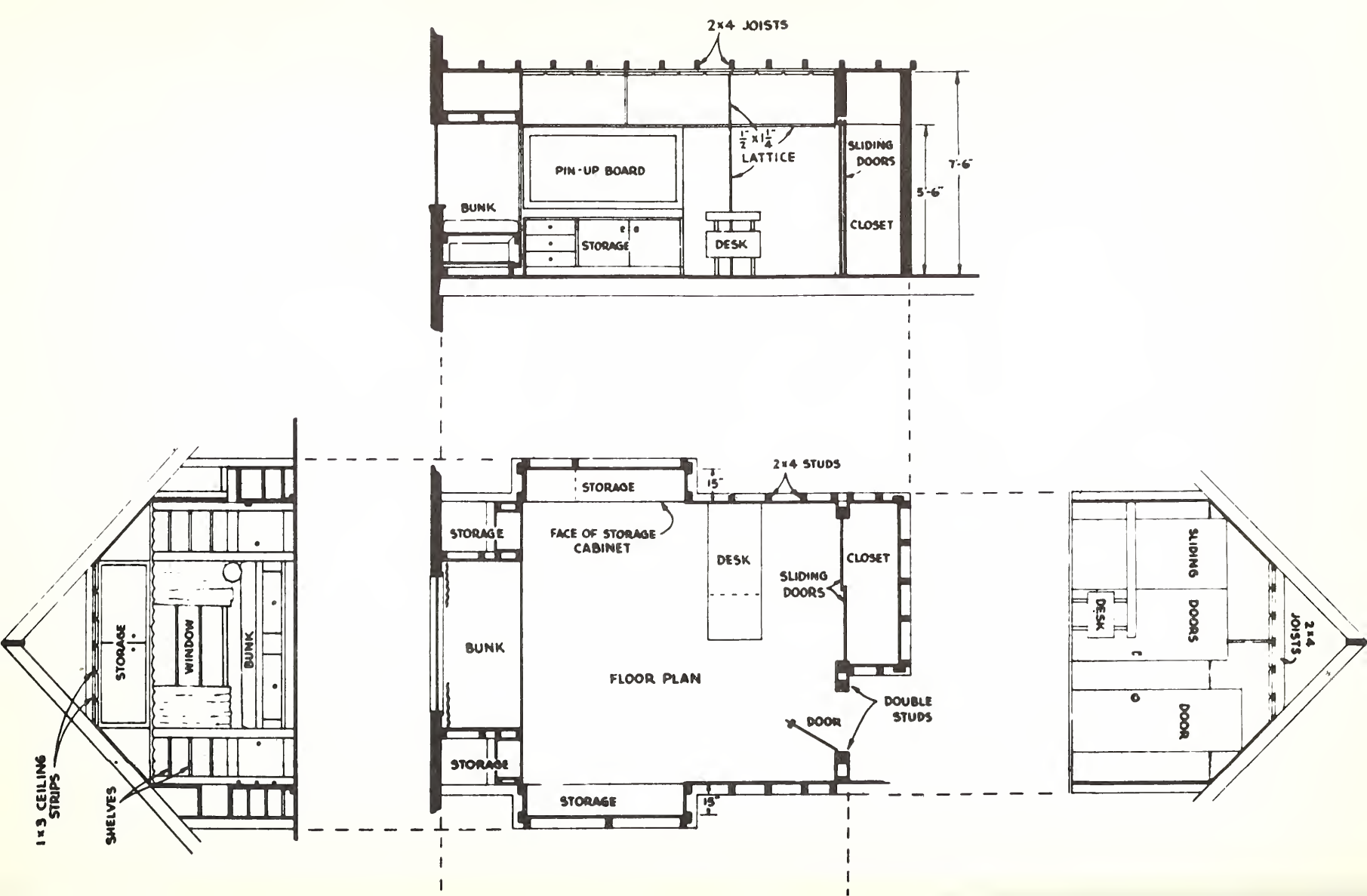


Figure **9–10** A typical attic room. *Courtesy of Skil Corporation.*


2×4 JOISTS
PIN-UP BOARD
1/2 × 1 1/4 LATTICE
SLIDING DOORS
7'-6"
5'-6"
BUNK
STORAGE
DESK
CLOSET
2×4 STUDS
STORAGE
15"
FACE OF STORAGE CABINET
DESK
SLIDING DOORS
CLOSET
BUNK
FLOOR PLAN
DOUBLE STUDS
DOOR
STORAGE
STORAGE
15"
STORAGE
WINDOW
BUNK
1×3 CEILING STRIPS
SHELVES
SLIDING DOORS
DESK
2×4 JOISTS
DOOR

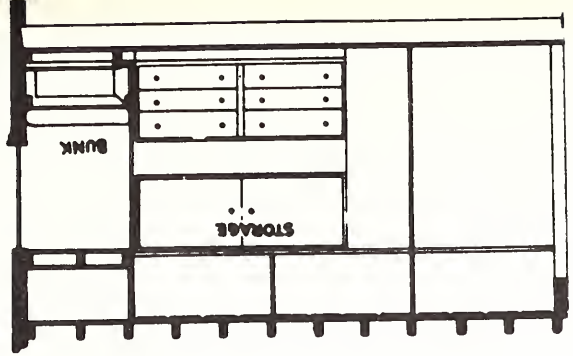



Figure 9–10 (*continued*) Layout of typical attic room. *Courtesy of Skil Corporation.*

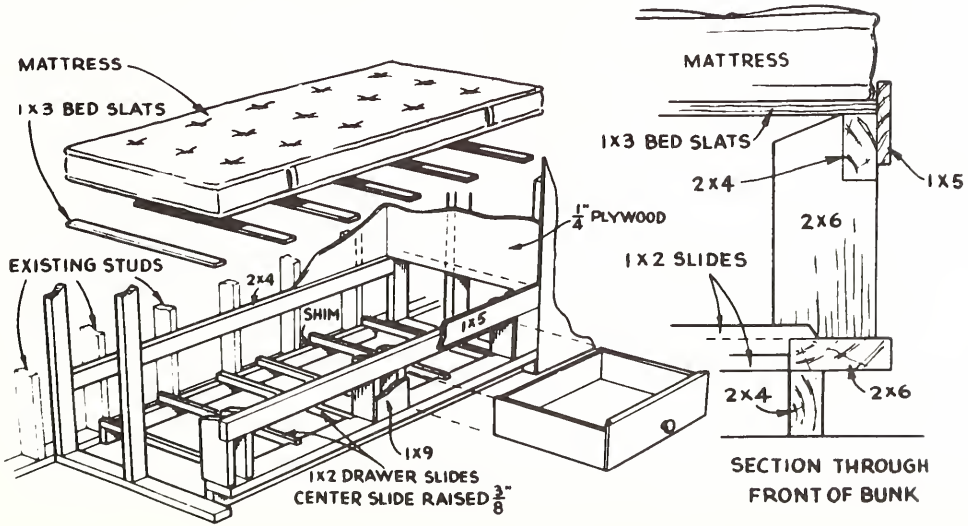



Figure 9–11 Bunk.

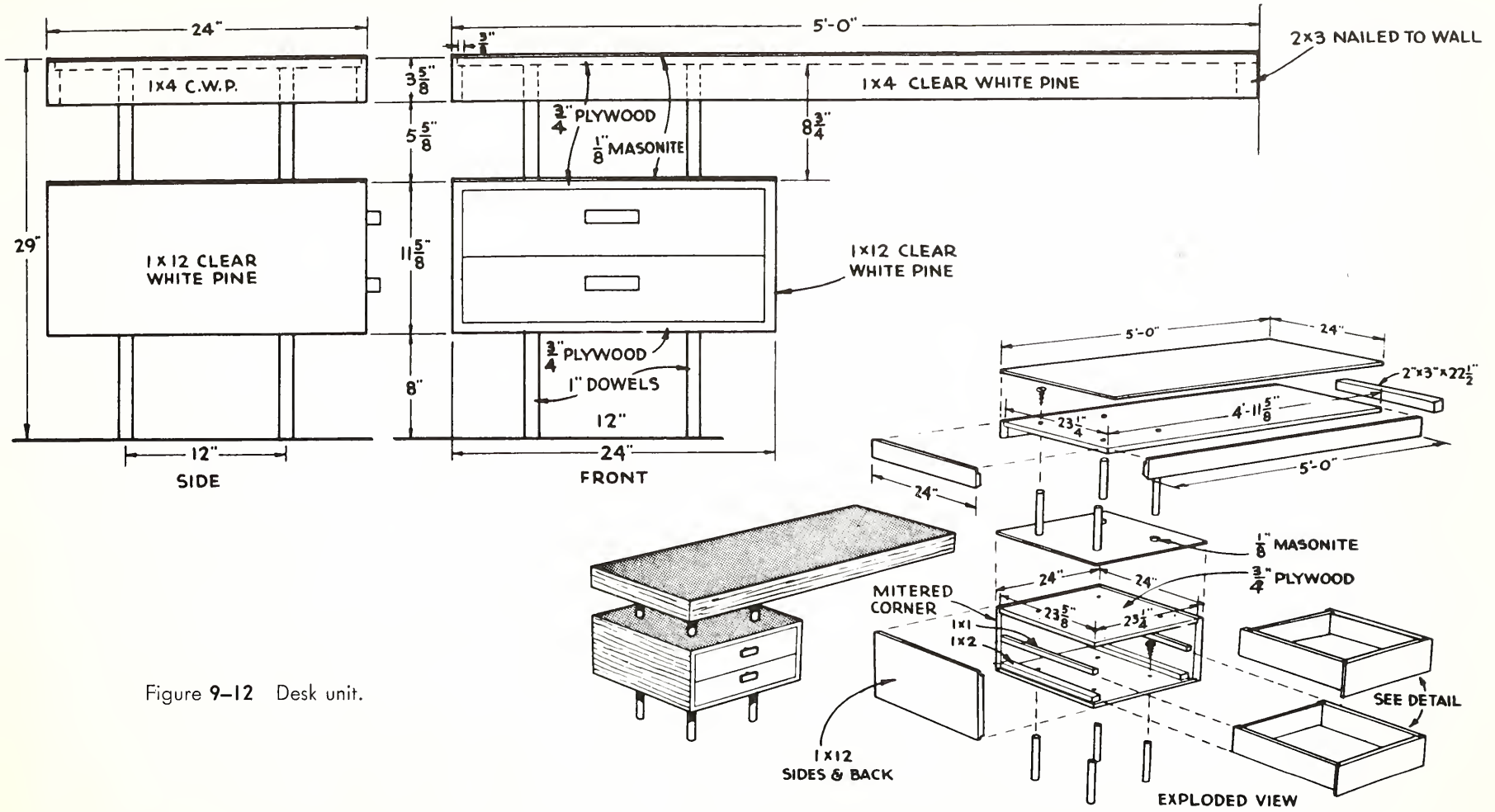



Figure 9–12 Desk unit.

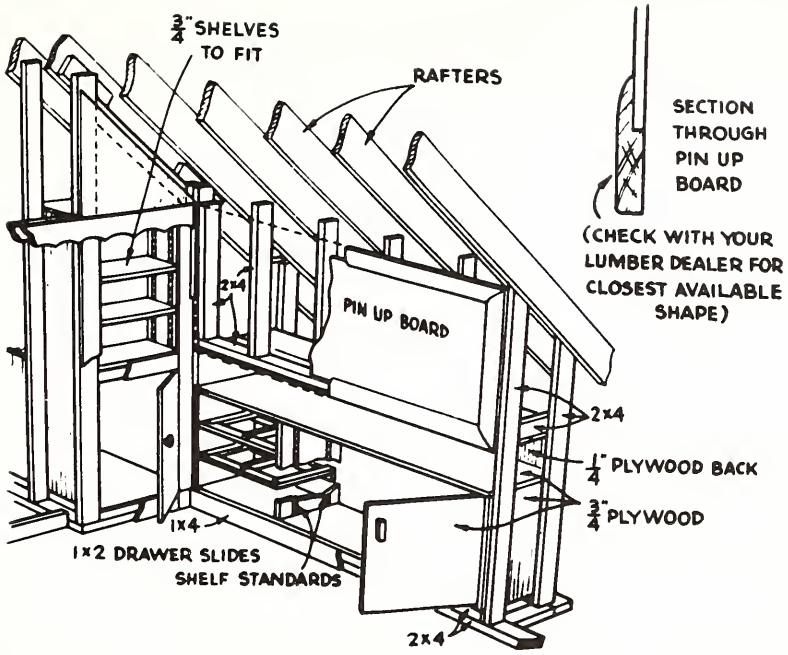



Figure 9–13 End-and-side storage compartments.

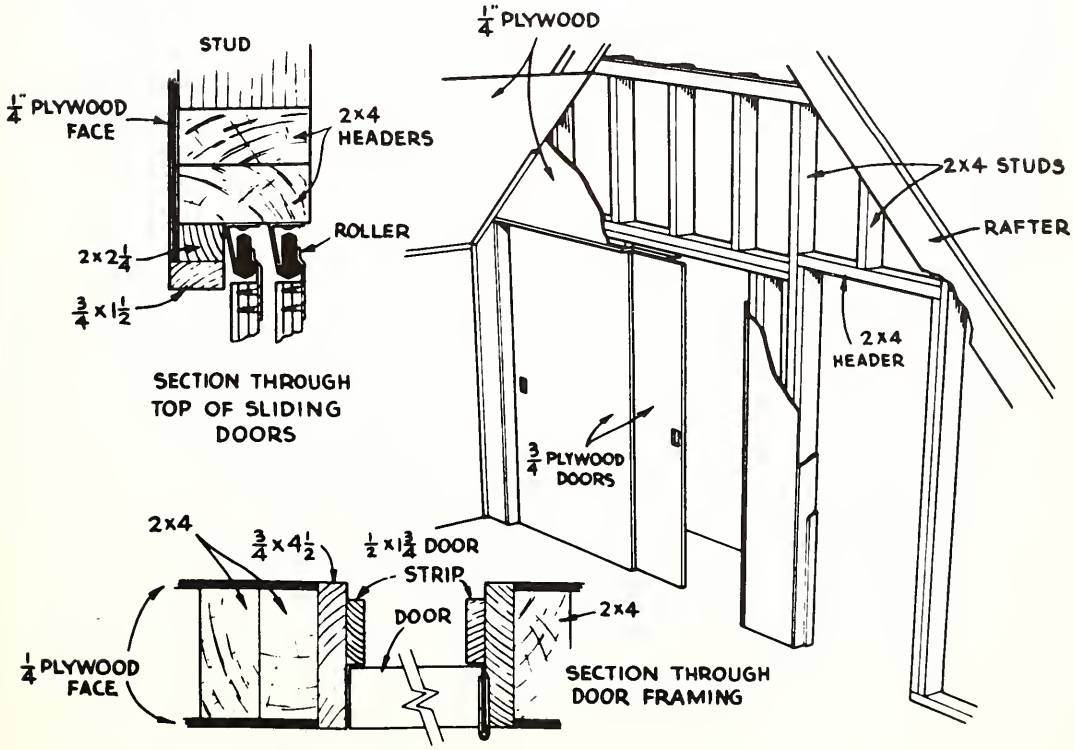



Figure 9–14 Closet with door, showing framing details.

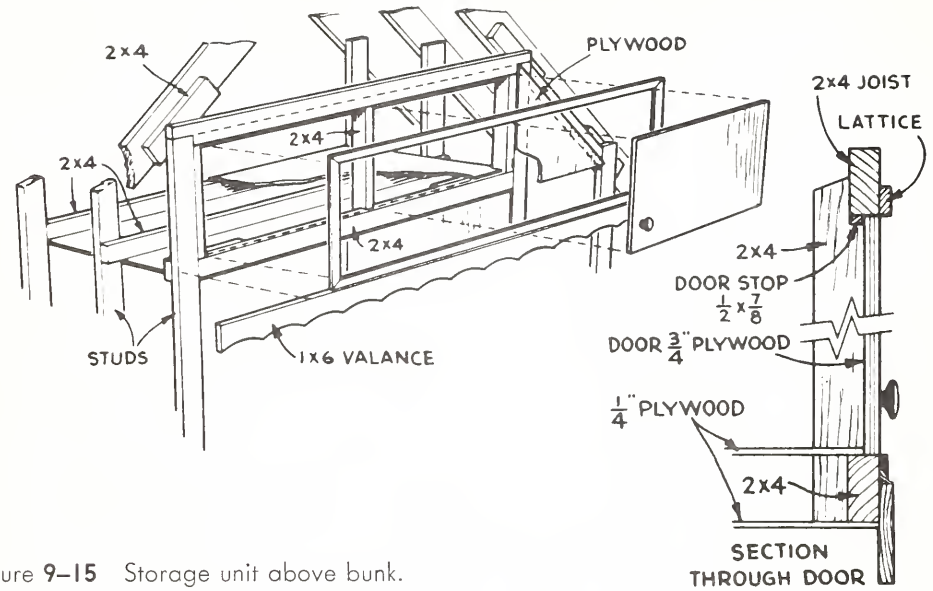



Figure **9–15** Storage unit above bunk.

attic and your needs. Study the plans carefully for a good working idea of how to do the job and make the room fit the space available.

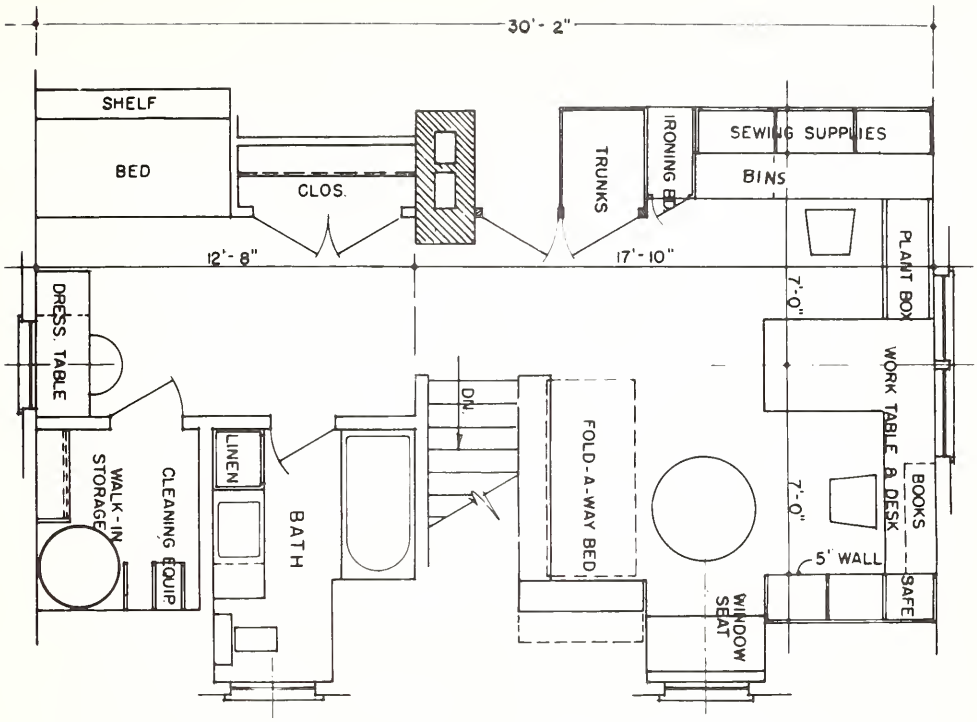
The attic shown in Figure 9–16 has been converted into a multipurpose room —a sewing room, playroom, and extra bedroom. Its personality is derived from the clever use of built-ins. Ten of these built-in ideas are shown in Figures 9–17 to 9–26.

Sewing facilities for the housewife are a major feature of this room. The sewing-supply store-away is a complete storage section for materials and equipment. The sewing machine sits in a compartment of the same height as the work counter, where it is easily pulled out. The shelves in the upper center section leave room for spools and bobbins to be hung on the back of the double doors by means of a set of spool racks. By scoring drawers and doors and fitting knobs in identical patterns an attractive uniform appearance may be achieved for the whole sewing storage wall.

Bins for clothes in need of repairs are located beneath the sewing counter. Both compartments may be fitted with drawers, or one side may feature a handy sliding shelf, as shown, for sorting patch or mending materials. The sewing counter itself may be covered with linoleum. The desk and worktable is specially designed for pinning and cutting patterns. The large worktable area may be covered with linoleum for a smooth, durable cutting surface. The desk section of this L has drawers for writing supplies.

The trunk and luggage cabinet in this attic is a far cry from the days when trunks and valises collected dust in the midst of attic clutter. Other features of the room are a foldaway bed, a window seat with space for storing blankets, linen and housecleaning closets, and a walk-in storage closet.

The planting box will add the charm of plants and vines to your room. Pebbles or a few pieces of charcoal should be spread in a ½-inch layer over the bottom, so that you can fill the planter with soil and place plants directly in it; or you may set in separate pots.



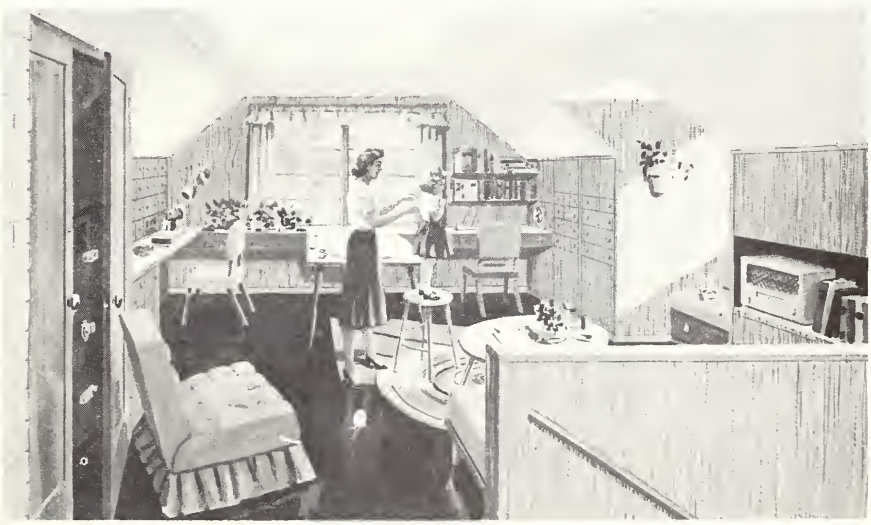



Figure **9–16** A multipurpose attic room. *Courtesy of Malarkey Plywood.*

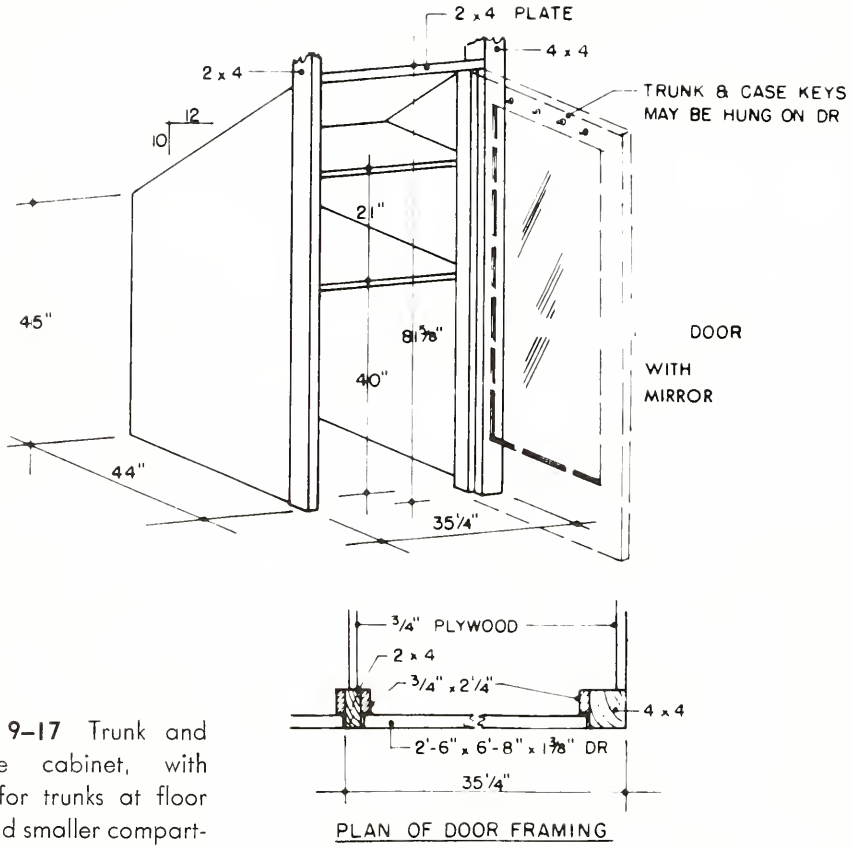



Figure **9–17** Trunk and luggage cabinet, with space for trunks at floor level and smaller compartments for suitcases above.

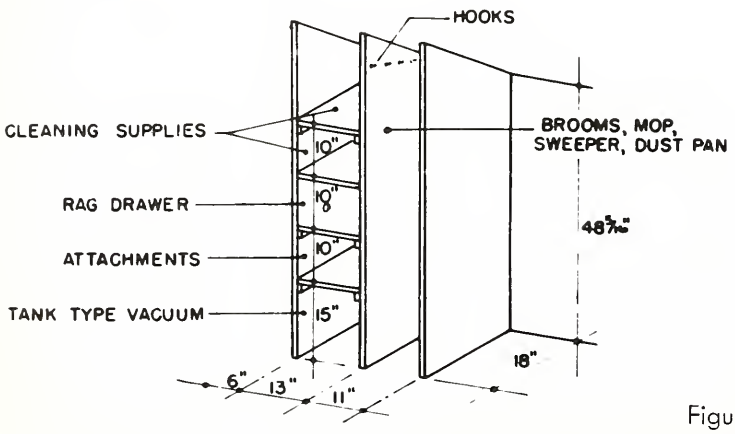



Figure **9–18** Housecleaning-equipment closet.

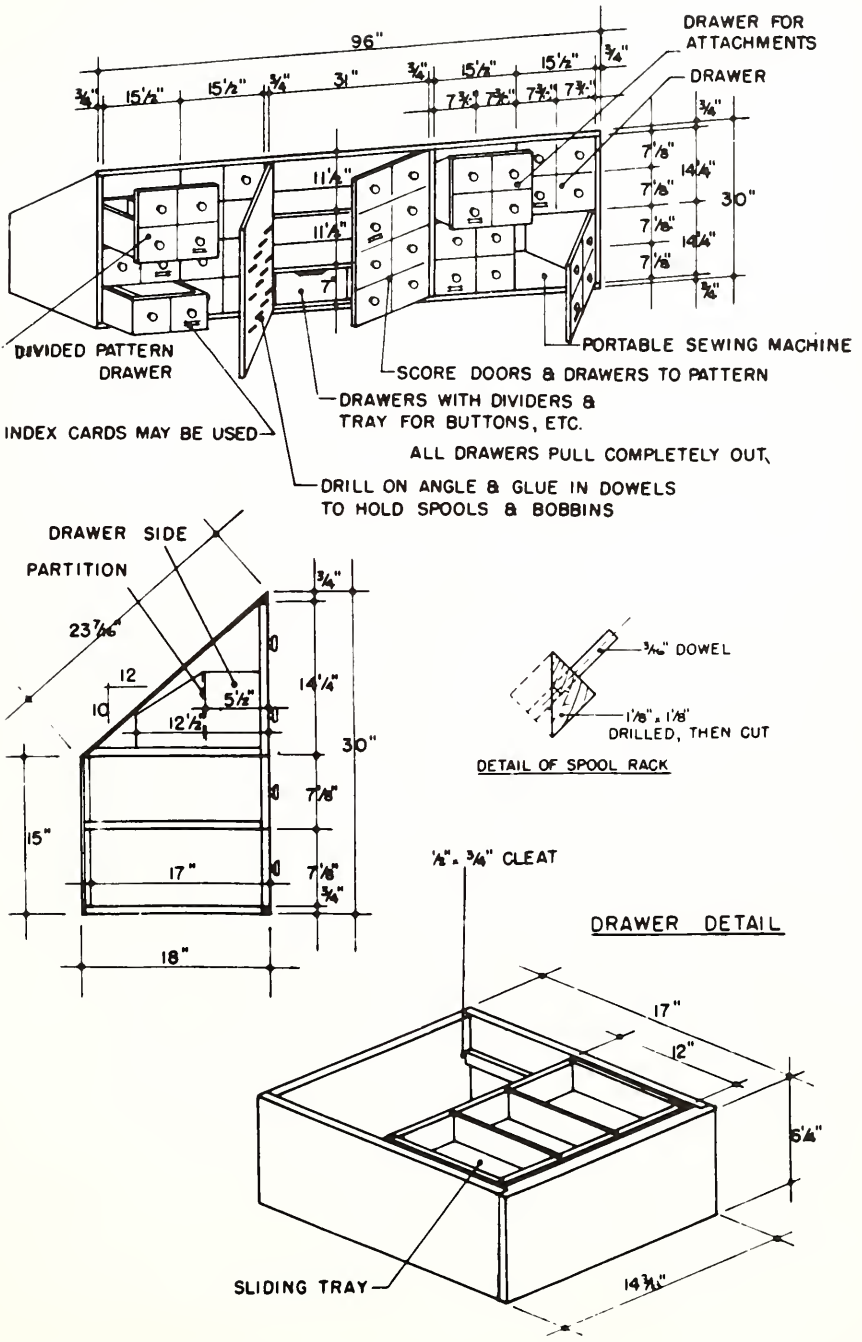
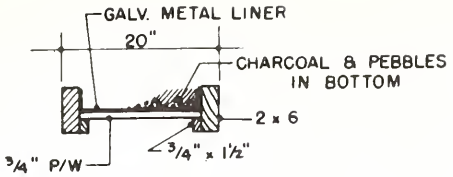



Figure 9–19 Sewing-supply store-away.




SECTION THRU PLANT BOX

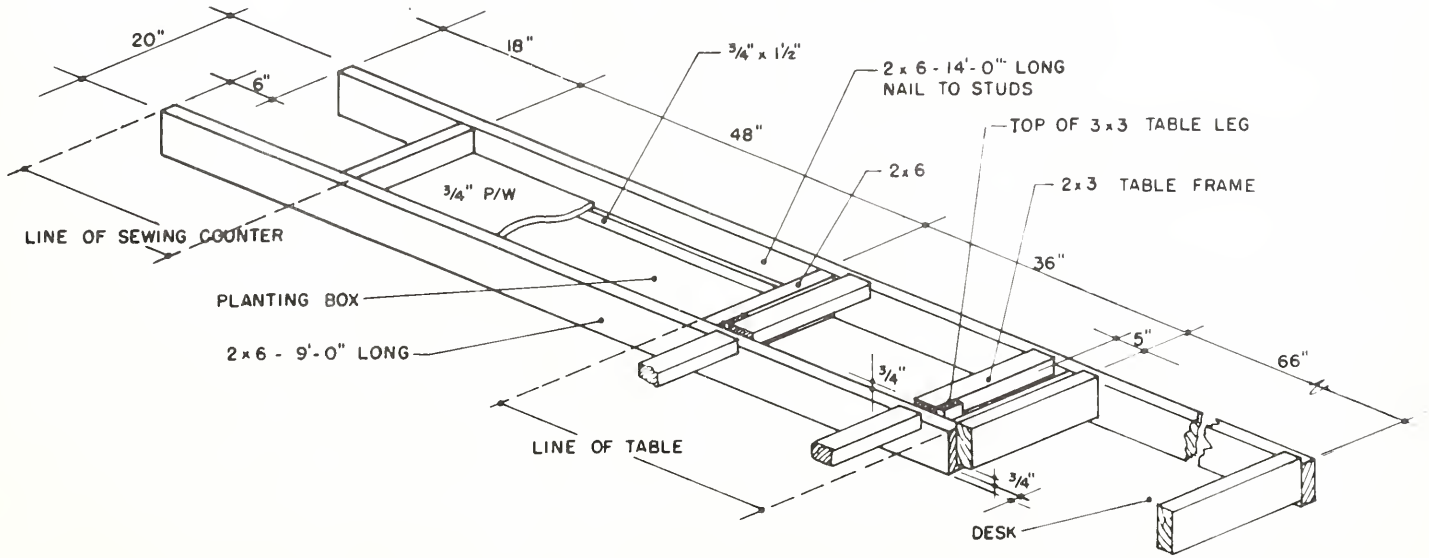



Figure **9–20** Planting box, lined with galvanized metal.

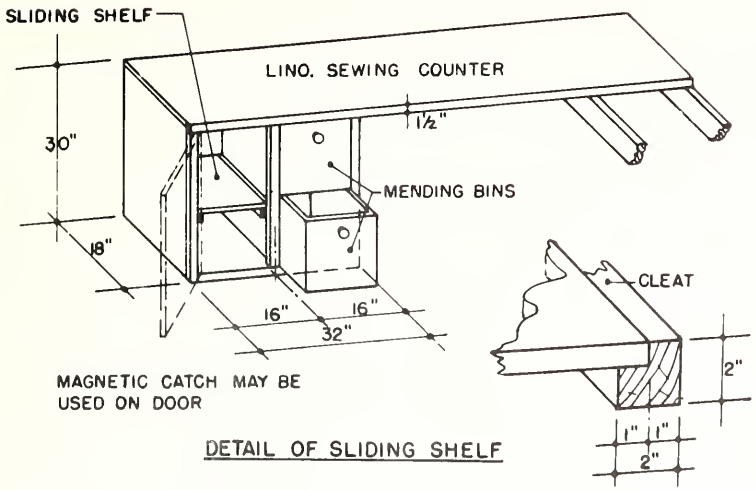
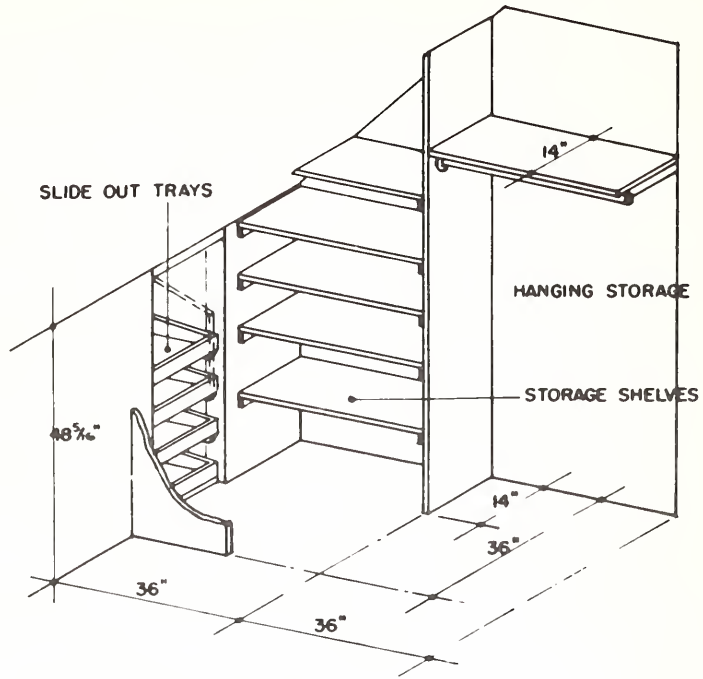



Figure 9–21 Sewing counter and bins.



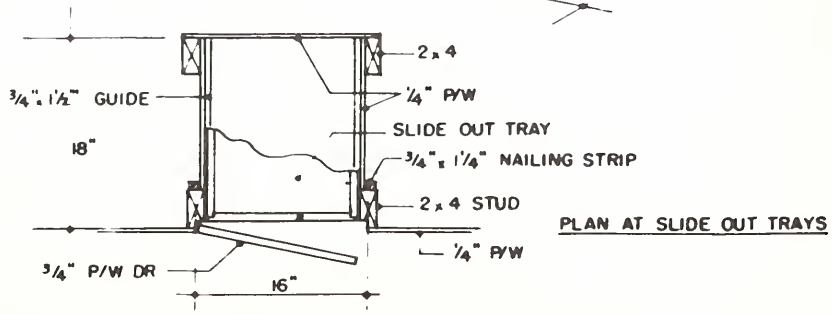




Figure 9–22 Walk-in storage closet, with space for hanging garments; shelves, and sliding trays.

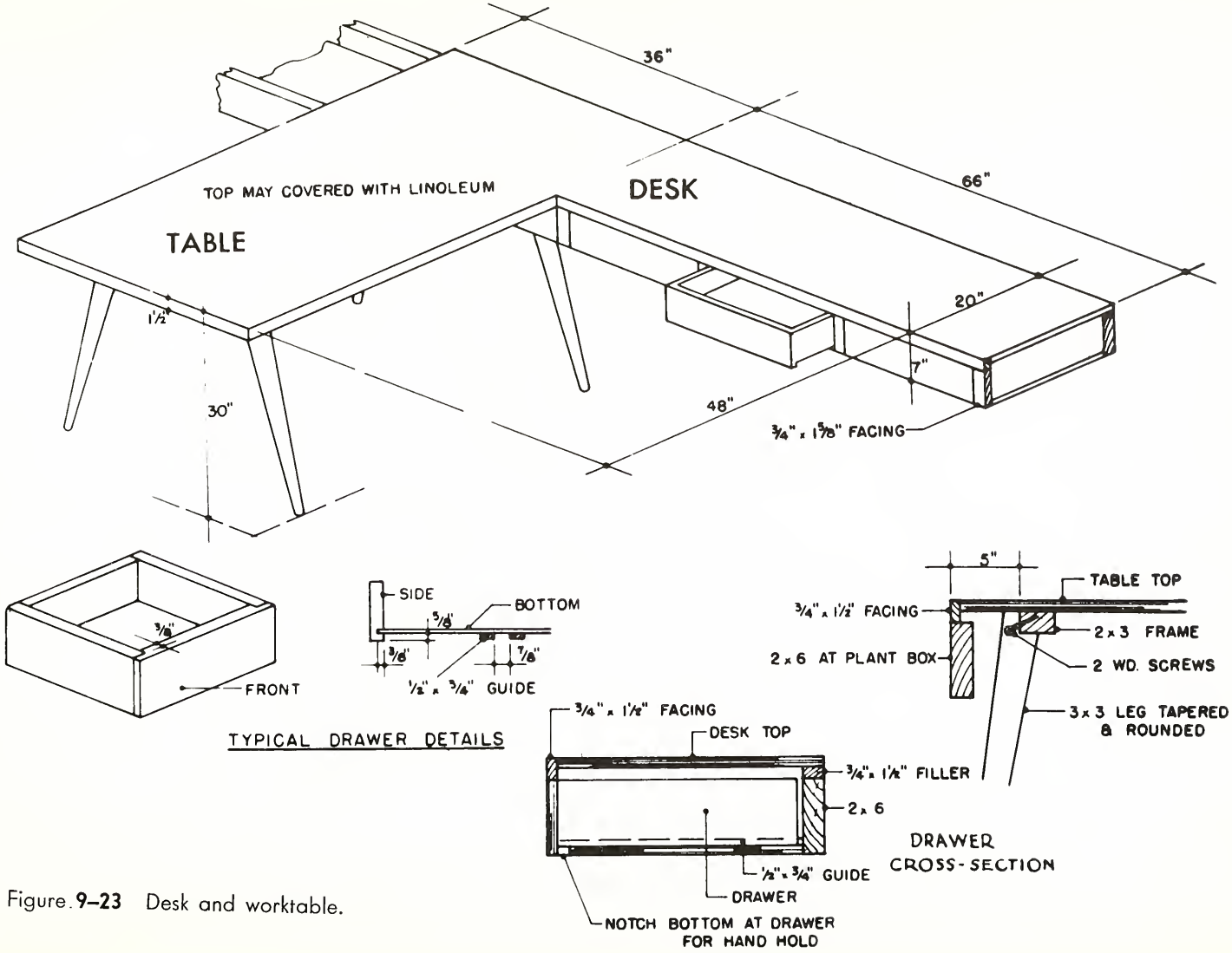



Figure 9–23 Desk and worktable.

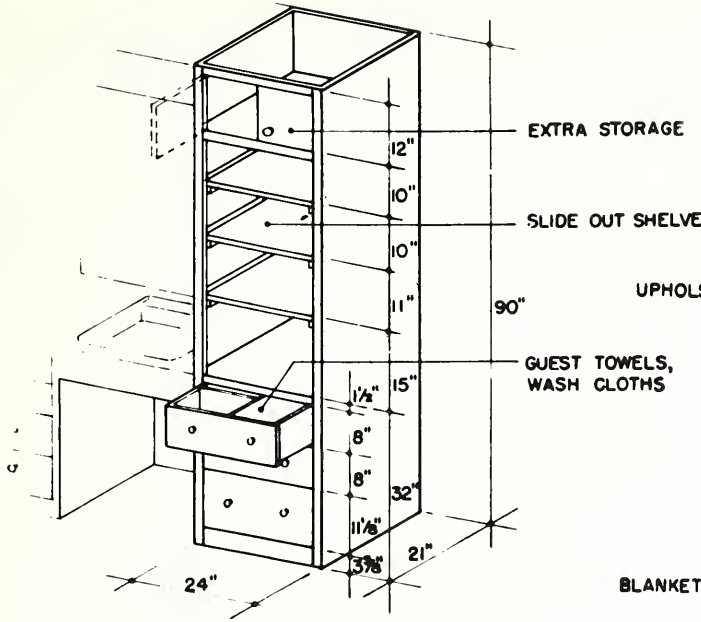



Figure **9–24** Linen closet, with shelves that slide out for easy access.

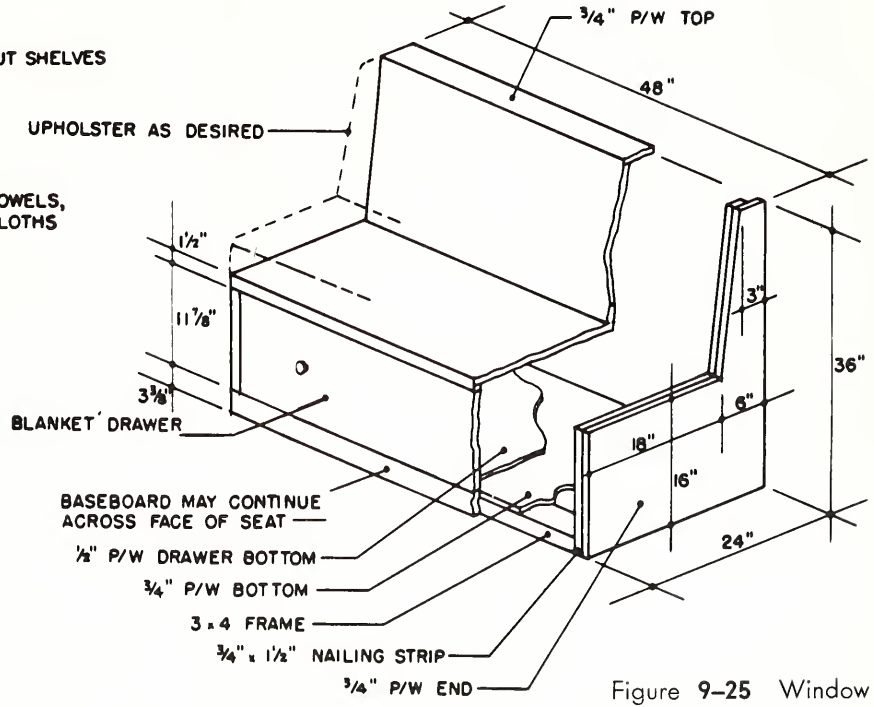



Figure **9–25** Window seat for the dormer-window nook. The deep easy-sliding drawer beneath the seat stores bedding for the foldaway bed.

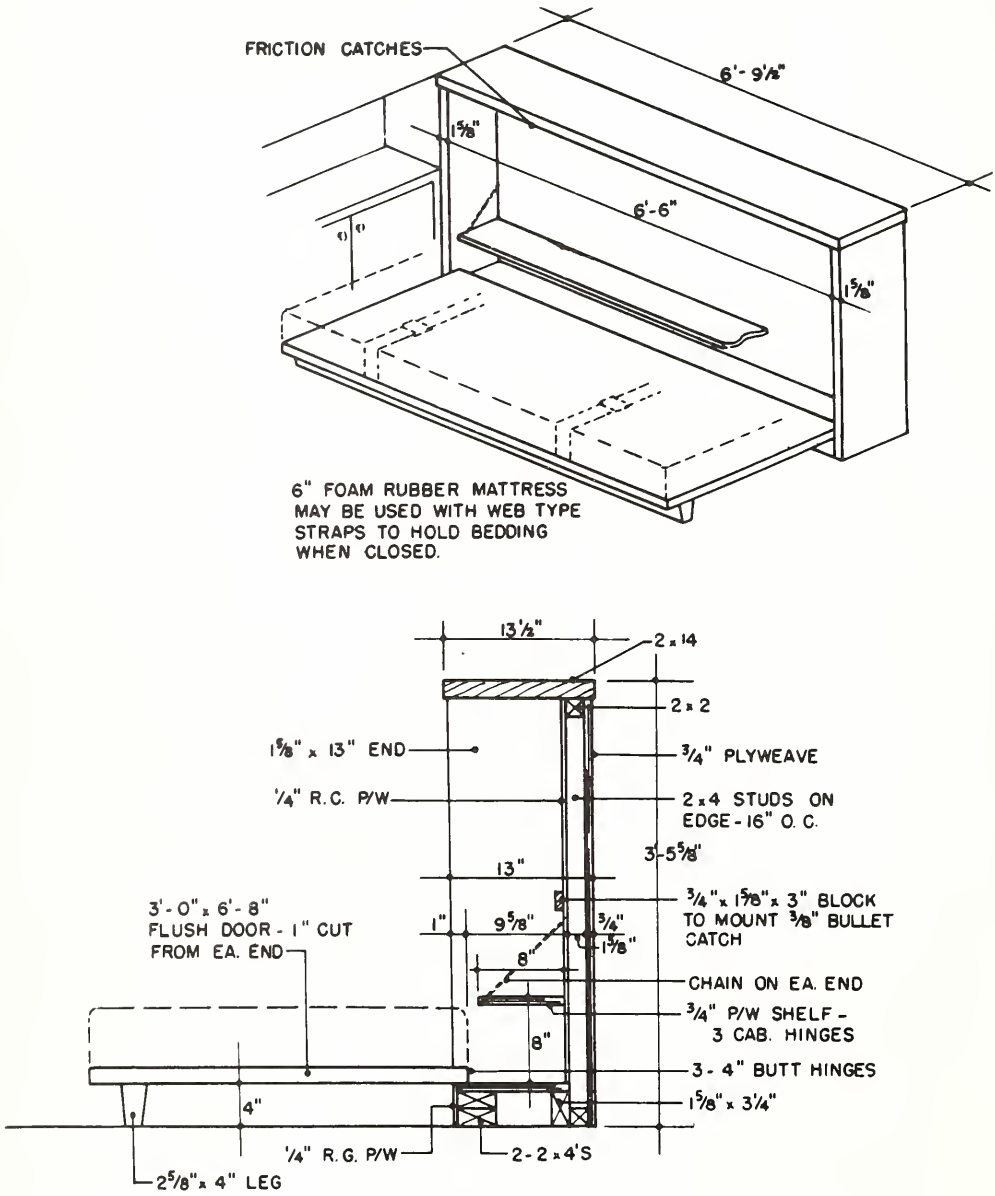



Figure **9–26** Foldaway bed, with a full-length leg which supports it firmly on the floor. The base is a flush door, 3 feet by 6 feet 8 inches, with 1 inch cut from each end. As the bed opens the bedside shelf also swings down.

## ADDING STORAGE TO FINISHED ATTICS

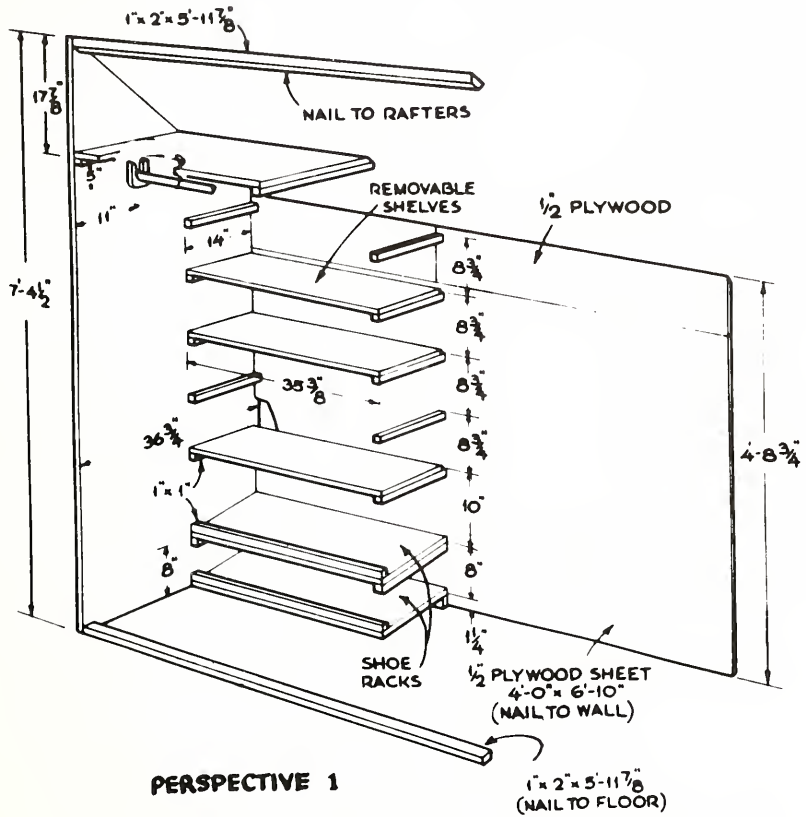
Between the side walls of an attic room and the outer edges of a sloping roof, there is waste space which can be used to good advantage, with no great effort and little outlay of capital. The side walls are supported by studs that extend from roof rafters to floor joists. These studs are rarely needed for roof support, and therefore may be cut through without weakening the house structure.

Before the initial step of breaking into an existing wall, find out if there is actually any usable space available. Hold one edge of a piece of cardboard 12 inches square flush against the wall, with one corner in the angle where the sloping and vertical walls join. Hold a ruler against the outer edge and measure the distance from the upper side of the cardboard to the sloping ceiling. With this figure, you can make a layout and calculate the distance from the present wall to the eaves. The average space may be anywhere from 3 to 5 feet or more along the floor level.

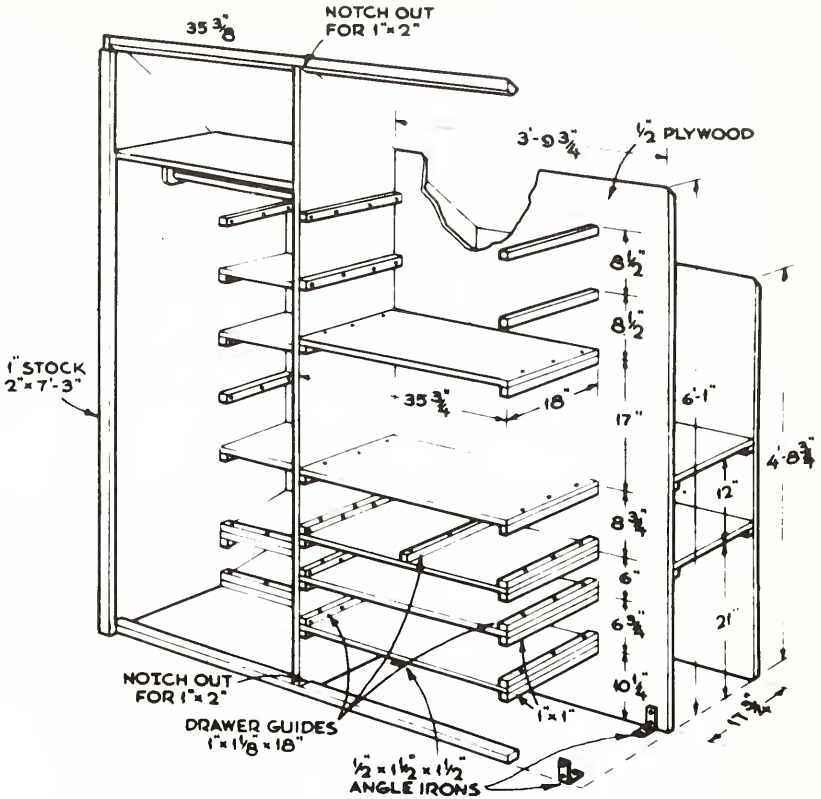
**Under-eave storage units.** Mark off on the wall the outline of the furniture, cabinet, or closet you wish to put in this waste space. It is economical and time-saving to use an existing stud as part of your final framework. Tap the wall until you have located a stud and use it as a



Figure **9–27** Plan for under-eave storage. *Courtesy of Douglas Fir Plywood Association.*




PERSPECTIVE 1




PERSPECTIVE 2

NOTE: VERIFY ALL DIMENSIONS TO SUIT INDIVIDUAL CEILING SLOPE

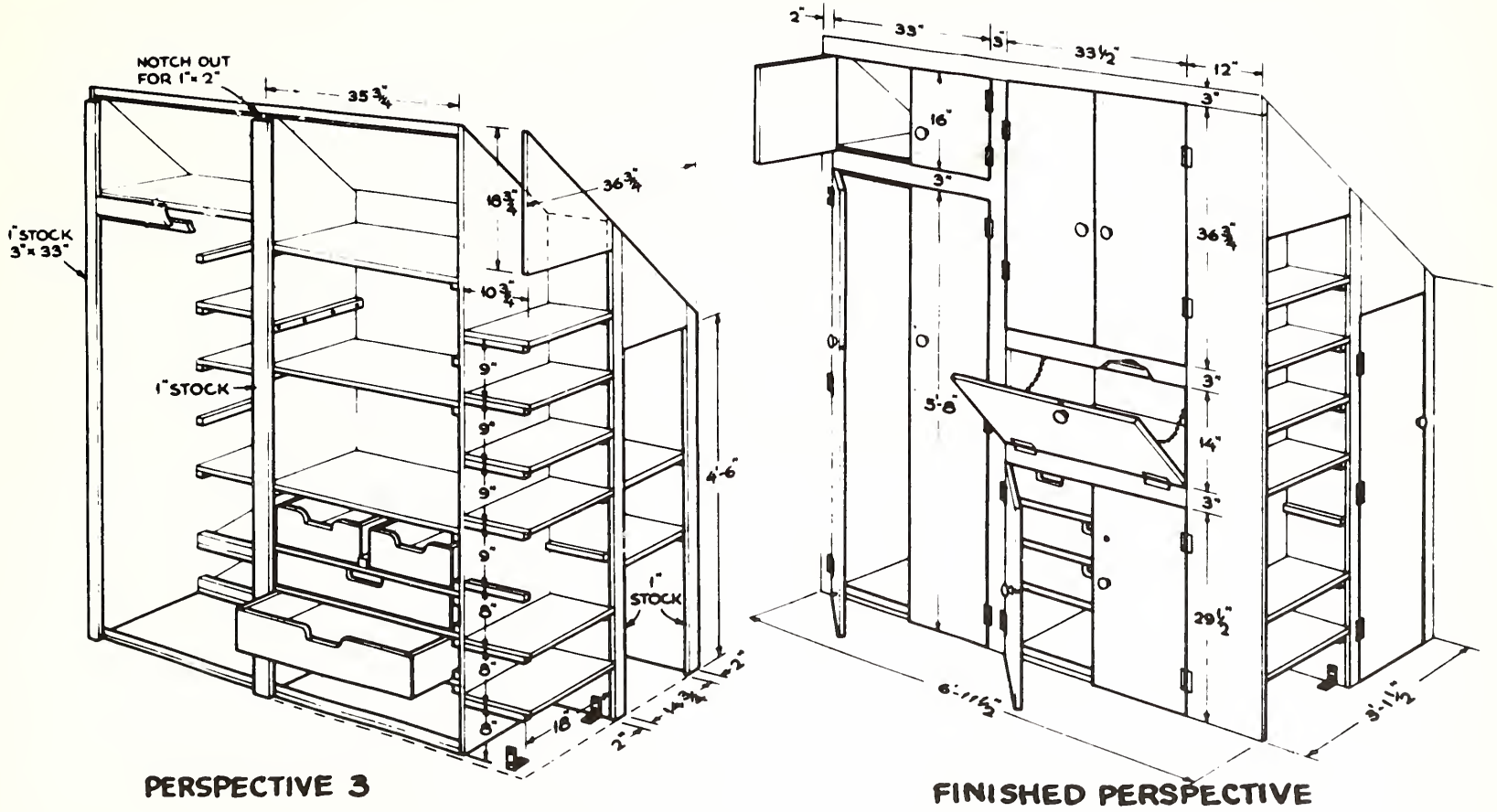



Figure **9–27** (*continued*) Diagram showing steps in construction of under-eave storage unit. *Courtesy of Douglas Fir Plywood Association.*

starting point. Then break into the wall. (See page 23 for details of cutting through wall surfaces.)

Once you have gained entrance to the waste area, check up on insulation. It may be a good idea to apply insulation (if none is there already) between rafters. You will not want cold air entering around or through your new installation.

The next step is to build a framework. Put a double header or lintel (2 two-by-fours) across the top of the opening. If you need to add another stud at one side, attach it to the rafters and floor joists by nailing stringers across 2 or more of each. Attach your new stud to the stringers. Build a second frame the same size as the front opening, and anchor it at the necessary distance into the opening from the front. Join the front and rear frames, completing the box frame. Use two-by-fours throughout. As a liner, ¼-inch plywood or hardboard, plasterboard, or other sheet materials will serve admirably except, of course, for the floor, which should be tongue-and-groove siding or box lumber. If you are building a closet, you may cover the rough floor with plywood or finish flooring.

Finishing the front of the opening will depend on its intended purpose. A closet must be finished for its door with jamb and casing. Standard door sizes will rarely fit this type of opening, but special ones can be built of ¾-inch plywood, or flush doors can be cut to size. Such closet space may also be covered with drapes.

If a piece of furniture is to be set into the opening, the front should be finished off carefully to blend with surrounding walls. To complete the job, a corner molding, paint, or wallpaper can be applied.

Book shelves can be inserted in such openings in the wall, and so can built-in cabinets or designs previously shown. A couch-style bed may be rolled away into the wall if an opening of the necessary size is provided for the purpose. Or a more elaborate construction like that shown in Figure 9–27 may be installed. In all cases, you have gained floor space.

# CHAPTER 10

## MAKE THE MOST OF YOUR BASEMENT

YOUR basement offers the opportunity for you to put many additional conveniences into your home without adding to the area your house covers. Here your skill and imagination have free play, for almost anything can be built into a basement. You may wish to devote most of the space to an adult recreation or rumpus room, or to a home gymnasium for the youngsters; or a workshop may be the important thing to you. But at the same time you can provide for a gardener's corner, a built-in playpen with a raised floor, for the baby, and a great deal of general storage space.

**Planning your basement.** When you plan a basement room, first consider its use. Then try to visualize the best materials for carrying out the plan. In order to enjoy the result of your efforts, plan carefully and wisely to make sure that these two important problems are solved.

If the new room is to be a workshop, for instance, some of the important considerations will be accessibility from the outside for bringing in materials; light and air; adequate space for the location of power tools and benches; accessibility to electrical outlets, water, and so on. Think also of the location in relation to the floor above and the transmission of noise to the living and sleeping areas. All of these considerations are not likely to be satisfied by any one location, so you must decide which are the most important and plan to satisfy those.

An enclosed space for a laundry, for a vegetable-storage room, or for general storage must also be planned to satisfy definite requirements. It usually helps to visualize the setup if you mark off the arrangement of fixtures accurately to size on the floor.

A basement recreation room presents other problems to the planner. In the first place, considerable open floor space is required, so the location should be relatively free from objectionable pipes, low girders, and inconveniently located posts. Although many of the illustrations in this chapter show rectangular rooms, a playroom may assume any shape that seems convenient for use and practical in construction. If winter heating is a necessity, the location may be planned to take advantage of existing heating arrangements.

After planning your layout, carefully inspect the existing basement before proceeding with construction. Here are a few preliminaries to take care of:

1. Remedy leaks and dampness.
2. Insulate water and heating pipes.
3. Repair and relocate electric wiring for new fixtures and outlets.
4. Check for sufficient light and proper ventilation.

**Dampness.** The most frequent cause of dampness in basements is surface water that collects near outside walls. Make sure that gutters and leaders are not clogged and that water runs through them

freely. Drainage pipes should be attached to the leaders or downspouts to carry the water from the house into a dry well or storm sewer. Banking or raising the ground around the foundation so that it slopes away from the house may improve the drainage. If the grade is raised above the sills of the basement windows, build shallow areaways around them. You can use asbestos sheets or masonry for the sides of the areaways. Line the bottom with cinders, gravel, or crushed stone. The soil around the foundation should be planted generously to help resist erosion.

If your basement is still damp, after these precautions, check the walls and floors for cracks. These may be repaired with a mortar composed of 1 part Portland cement and 2 parts clean sand. Chisel out the crack to a width of at least ½ inch, clean it thoroughly, and soak it well with water. With a trowel, force a small amount of the mortar into the opening. In all cement and concrete work be absolutely sure that the dry ingredients are thoroughly mixed before adding water.

If the entire floor is wet or in bad condition, you may have to lay a new one. First cover the old floor with hot tar or asphalt mopped on liberally with a regular tar roofing brush. On top lay the concrete 2 inches thick: 1 part cement, 2 parts of sand, and 4 of fine gravel mix. Reinforce this with lightweight steel wire mesh placed in the middle of the new layer. The mesh should be no lighter than 14 gauge. To prevent cracking, the floor should be kept moist for not less than 3 days. Covering an old floor with asphalt tile laid in watertight mastic may also reduce or eliminate moisture.

Should interior basement repairs fail to stop dampness, the only recourse is outside waterproofing. Begin by digging a trench around the complete foundation as deep as the footings. A line of drain tile should be laid at the bottom of the trench at a pitch of 1 inch in 4 feet, and connected with a sewer, dry well, or other outlet at a lower level. Before the excavation is filled, the walls should be coated with pitch, asphalt, or a ½-inch layer of waterproof Portland cement plaster.

After the concrete work is thoroughly dry, the whole cellar should be given a dust- and damp-proofing treatment with any one of many special basement paints, used according to the manufacturer's instructions.

Even if walls and floors are watertight, condensation can cause dampness in your basement. To prevent this, be sure of a plentiful supply of fresh air. Keep basement windows open as much as possible.

**Pipes.** Uninsulated cold-water pipes are a source of annoyance because of the condensation formed on them during the summer months. Play safe and insulate them before undertaking new construction; then you can be sure that no damaging water spots will appear on your new ceiling. There are several easily applied products that will take care of this trouble. A wrapping of hair felt is a standard remedy for sweating pipes. Builders' supply companies and hardware stores also feature mastic preparations that may be painted on, or tapelike materials that are easily wrapped about pipes.

Remember to provide access to all turnoff valves, traps, and the like when planning the finished walls and ceiling. It is better to allow a few of these mechanical necessities to be exposed than to find them sealed off when an emergency arises.

**Wiring.** Take care to protect all electric wiring during construction. It should be unnecessary to warn against the consequences of short circuits caused by damaged wiring, or improperly installed outlets. You will find that it pays in peace of mind and security to engage a licensed

electrician. Consider the proper type and location of ceiling fixtures and utility outlets to suit the purpose of the room.

Provide enough wall plugs and adequate overhead lighting. While lighting fixtures should follow the character of the room, they may be unique and original. Often they can be constructed of inexpensive materials.

**Light and ventilation.** Light and air are as necessary in the basement as elsewhere in the house. This is especially true if you expect to spend much time in the room, and wish to have it usable the year around. If the windows are small or too few in number they should be enlarged. Window ventilators of the kitchen-fan type (see Chapter 5) may also be needed. As moist air is heavy, it has a tendency to remain near the floor so that it is sometimes difficult to remove it by simply exhausting the air at window height.

Enlarging basement windows by cutting out the masonry with a cold chisel and substituting larger frames is not too difficult in many cases. If the bottom of the window frame remains above the level of the grade, either casement or pivoted swing-out windows can be installed in the new framing. Windows which are close to or below the grade require an areaway, as described above under *Dampness.* Such windows may be of the swing-in casement type or the steel-framed, tilting type. To reflect additional light the inside of the areaway should be painted light yellow or cream.

**Wall treatments.** In most basements the poured foundation is thicker than the wall above ground, resulting in a setback near grade level. A wainscot effect can be achieved by finishing up to this line with paint and filling out the depression above with some sheet material. For cement or brick walls, a cement-bearing paint is recommended; 2 coats are generally required for good coverage. Paints of this type bond themselves to the wall, thus coloring, waterproofing, and preserving in one operation. Cracks must be patched and any oil paint removed with lye or trisodium phosphate before painting. Cement paint will not adhere to smooth surfaces such as wood or plasterboard. Stains, washable calcimine, plastic paint, or the new casein paints are suggested for smooth surfaces. Ordinary inside oil paint is also suitable, of course.

Before proceeding with any wall finish, all openings—around pipes, where ceiling and walls meet, etc.—should be closed up with wood or plaster. Unfinished places like this not only spoil the appearance of the room but are points of heat loss as well.

In many cases a complete covering of the walls is desirable. There is a wide choice of suitable materials: plasterboard in plain and wood-grain effects, wallboard and hardboard in sheets, tile, plank, genuine knotty pine, slab wood for log-cabin effects, and plywood. If real wood, such as knotty pine or plywood, is used, it is advisable to back-prime it with a resin sealer or a good paint primer before erection.

Irregularities in the foundation usually make it necessary to attach furring strips to basement walls before any materials can be applied. To erect panels over existing masonry walls apply 1-by-3 or 2-by-3-inch furring strips, 16 inches on centers, to provide the necessary nailing surface. Before furring, it is wise to coat the walls with a heavy layer of asphalt or water-resisting paint. The furring is plumbed true and secured to the masonry with steel-cut nails spaced 12 to 14 inches apart, using 6*d* concrete nails for 1-inch furring and 8*d* for 2-inch furring. Use a small star drill to make holes in the masonry if there is any difficulty in driving

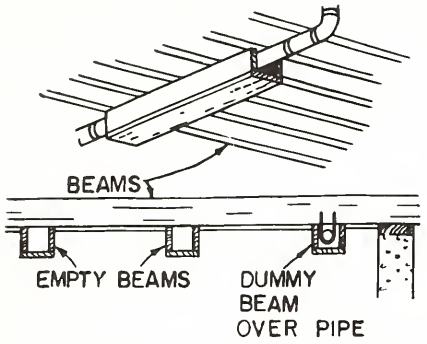



Figure 10–1 A method of covering ceiling pipes in a basement. *Courtesy of* American Legion Magazine.

the nails. Any basement walls may occasionally become damp, but this occasional dampness can be taken out from behind the paneling by leaving a ¼-inch gap along the top and bottom edges of the paneling to allow air to circulate. The sheet panels are applied as described in Chapter 3.

**Ceiling treatments.** If your basement ceiling is plastered, it will require only calcimining or painting. For exposed floor joists a number of treatments are possible, depending on the type of room you want and the amount of expense you wish to go to. The installation of a ceiling in a portion or all of the basement will not only improve the looks and value of this part of the house, but will prevent dust and drafts from infiltrating into the upper floors.

Ceilings of insulation board, plasterboard, asbestos cement board, hardboard, plywood, and wood can be installed in the same manner as walls. However, insulating and acoustical tile are now more popular. Methods of installation are outlined under *Ceilings* in Chapter 3.

It is good policy (and required by many building codes) to make the ceiling over the furnace or heater fire-resistant. Some of the more economical materials that will serve this purpose are galvanized sheet metal, plasterwood, asbestos cement board, and plasterboard lath or metal lath covered with cement plaster. This protecting panel is usually 8 to 10 feet square (consult your local code). The remainder of the ceiling may be finished with any material desired.

If you have overhead pipes with sufficient headroom beneath, it may prove desirable to conceal them completely with a false ceiling. A framing of 2-by-2 or 2-by-4-inch furring is dropped from the ceiling rafters far enough to clear the overhead piping. A dropped ceiling may be constructed as described for the kitchen, Chapter 5.

Pipes can also be boxed in and made to look like beams (see Figure 10–1). Dummy beams may be installed to give the effect of beams spaced at regular intervals. Before enclosing the exposed pipes, however, they should be thoroughly checked for any signs of leakage or condensation.

If you do not finish the ceiling, you can give the room an appearance of height by painting the beams a light color, and painting the pipes, underflooring, and bridging a darker shade or a contrasting color.

**Floor treatments.** Painting, if correctly done with proper materials and preparation, is a very satisfactory and inexpensive way of finishing the floor. Unfortunately, however, many painted floors turn out badly, due to dampness and alkali in the cement, which softens and discolors the paint. Grease from soapy water, around the washing machine and laundry tubs, is also a frequent cause of paint failure. The floor must be cleaned thoroughly before painting. Flushing off with water alone is not sufficient. The surface must be scrubbed thoroughly with a grease-dissolving compound, until all grease and soap are removed. To make such a solution, dissolve 1 pound of trisodium phos-

phate in a gallon of warm water. Follow the scrubbing with a final rinse of hot water.

To remove small spots of grease, oil, and soap, place sawdust or fine shavings on such spots and soak overnight with a solution of 1 pound of lye to a gallon of water. Brush away sawdust a day later and scrape the spot clean. Then wash the spots down with a trisodium phosphate solution.

There are 2 types of paint that are used on basement floors—rubber-base and oil paint. Paints made with a chlorinated-rubber base are quite new and are more reliable on concrete than oil-base paints. However, oil-base paints made for use on concrete are easier to use, are considerably less expensive, and wear well if there is no moisture in the concrete. Cleaning is a necessary preliminary step with either paint unless the concrete is new. Both are applied with a brush and the manufacturer's directions should be followed to the letter.

Asphalt tiles will provide a lasting floor surface that is both colorful and waterproof.

**Columns, stairs, etc.** Columns can nearly always be effectively worked into the decorative scheme by some simple treatment such as that shown for overhead pipes.

The problem of camouflaging unsightly household necessities can also be solved with a little thought. For instance, a movable cabinet for old-fashioned laundry tubs not only hides their ugliness but also serves a useful purpose as a table; unobtrusive casters permit its easy removal on wash days, and it can be utilized from the rear as a stand for the ironing board.

Your basement stairs can be converted from a potential deathtrap to an inviting and safe stairway. The addition of risers and a good-looking balustrade will add to the appearance of the steps and strengthen the structure (see Figure 10–2). It is a good idea, from the standpoint of safety alone, to box-in the basement stairs. The generally neglected space under the steps can be converted to a useful storage locker (see Chapter 11).

As basement stairways are nearly al-

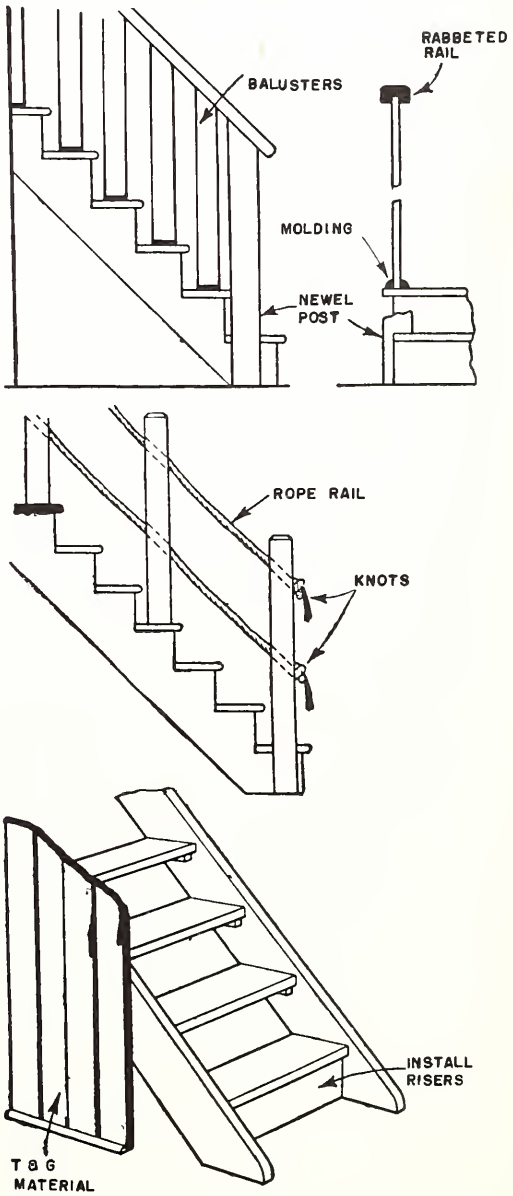



Figure **10–2** Ideas for basement balustrades. *Courtesy of United States Gypsum Corporation.*

ways dark, painting the risers a light color helps to avoid accidents. Proper lighting of the steps is also essential.

**Heating.** If your heating plant keeps the basement comfortably warm in the coldest weather, a lattice grille built in a partition may be adequate. If the heating plant is within the room, it may be practically concealed by means of a lattice structure. However, modern heating plants usually give off very little heat in the basement, except that from uncovered pipes and ducts, so it may be necessary to provide other means of heating.

In the case of a hot-air plant, a separate pipe should be run from the furnace to the room. With a hot-water or steam system an overhead radiator serves the purpose. (A floor radiator is impractical because it would be below the level of the water in the boiler which would not circulate properly.) If none of these methods solves your problem, or if your heating plant is already taxed to the limit to heat the upper floors, the installation of a gas-steam radiator is recommended. This is a self-contained unit requiring only a gas connection.

**Heater enclosures.** It is not uncommon these days to see the main heating plant located at one end of the finished basement. The modern basement heater is usually a good-looking piece of equipment, and all except the hand-fired coal-burning units are clean, unobjectionable mechanical devices. However, the furnace can be enclosed by using decorative shades, tall window shutters, porch blinds, or a screen. A permanent enclosure can be constructed of fixed Venetian blinds and will not only successfully conceal the most unsightly of furnaces, but also permit a free circulation of air.

When one side of the heater section can be left open to an unfinished part of your basement, the problem of air circulation is simplified; the other two sides can then be enclosed in knotty pine or wallboard, with a door at the front, or a fairly tight latticework enclosure can be erected on the studding, with latticework doors.

**The home workshop.** Items to be considered in planning a shop include wiring, lighting, treatment of walls and floors, soundproofing, ventilation, sawdust disposal, built-in features, heating, tool layout, etc.

The last item—arrangement of tools—is often assumed to cover the whole subject, but as a matter of fact floor plans are useful only in giving the beginner a general slant on tools needed and space required.

When setting up a workshop, in either a new or old house, the first thing to consider is its location. Ask yourself the question: Will my workshop have adequate space for my projects? There is nothing more discouraging than trying to work in cramped quarters. Therefore, you will save a lot of time and headaches, and do better work, if you stop at the beginning and consider the size of your workshop. A good small shop can be set up in a 7-by-10-foot space, but the efficient minimum is considered to be approximately 9 by 12 feet. A large, completely equipped workshop may require an area up to 15 by 20 feet. Whenever possible, the shape of the floor space should approach a square as this permits a step-saving arrangement of tools, bench, and materials storage to the best advantage.

Consider, too: Is my shop accessible? This applies not only to you, but to the materials that must be brought in and completed projects that will be taken out. You've heard the gag about the fellow who built a beautiful boat in his basement and then had to tear down the house to

get it out. Consider the size of the doorway in relation to your projects. A 3-foot minimum is best, though you may feel you can get by with a 2½-foot opening. Avoid narrow, twisting stairs and halls, if possible.

Good artificial light is essential, especially if you do most of your work at night. Lighting can be direct or indirect, incandescent or fluorescent. For general light, fluorescent lighting is easy on the eyes and easy to install. Incandescent light, with silvered bulbs that can be pulled down, is best for close work. Most of the new power tools come equipped with lamp attachments. Of course, the more natural light you can get without shadows, the better. To improve the natural light, many home craftsmen have replaced old cellar windows with larger ones.

Ventilation is important. Sanding, ripping, and lathe work create a certain amount of dust. One easy method of eliminating dust, aside from the dust-collector attachments available for most power-driven machines, is to build a small ventilator unit out of an old electric fan and a piece of thin galvanized metal. Another method, where the home is equipped with a forced-warm-air heating system, is to have an outlet from the heating pipe come into the shop so that warm, fresh air is forced in and stale air is forced out.

Hand in hand with the ventilation problem is that of moisture. Uncontrolled dampness may warp lumber, separate the layers in plywood, and rust tools. Therefore, choose a dry spot for your workshop; use dehumidifiers and even waterproof the walls if the problem is severe. Avoid locating your shop near damp areas of the house, such as the laundry. During summer months, when basement humidity is high, use some system of forced ventilation, as previously described.

Concrete floors are generally well suited to home workshop use. But the rougher the surface, the harder it is to keep clean. Smooth, painted or asphalt-tiled floors will cut down your clean-up time. A piece of rubber matting placed in front of the workbench or power machine will eliminate the fatigue caused by standing long hours on a concrete floor. Consider, too, covering the walls and ceiling of your shop with some inexpensive paneling material such as insulating board, plywood, or hardboard.

Correct wiring of your workshop is of utmost importance. In the beginning you may have no need for special wiring—you may start with one or two power tools and plug them in at existing outlets. As your shop grows, you will want 2 branch circuits wired independently of each other. The 2 lines should generally be rated at 15 amperes each. One line is used for shop lighting and the other for power tools. However, before starting any wiring check with your local electric company; all work must conform to their service rules and local electrical codes.

The seriousness of the noise problem in your home workshop depends largely on the complaints from other members of the household. Avoid placing the shop beside or under the quiet areas of your house. Also check transmission of noise through walls and heat ducts with a mallet and block of wood. Rubber mountings should be placed on all power tools. Where the noise problem is serious, you can apply acoustical tiles to the ceiling or walls.

*Workbench.* In equipping and planning your workshop it is well to remember that the heart of your shop is the workbench. This workbench, while very important, need not be elaborate or expensive and can be made as one of your first workshop projects.

The bench shown in Figure 10–3 is practical and rugged, yet simple to con-

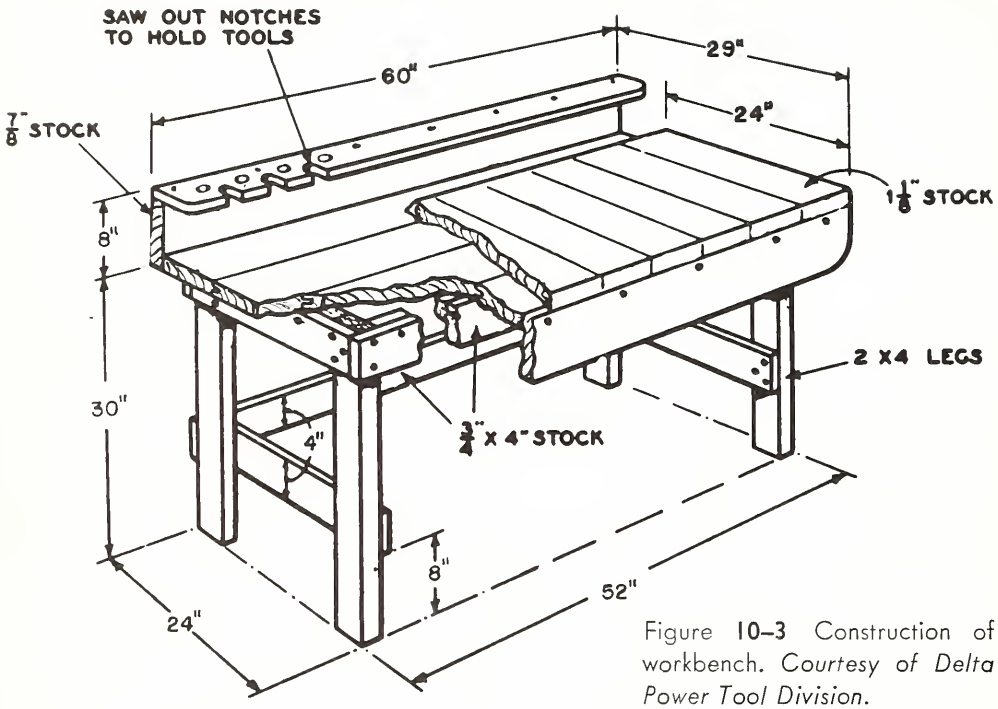



Figure 10–3 Construction of workbench. *Courtesy of Delta Power Tool Division.*

struct. Even if you have never touched a woodworking tool before, you can follow the complete plan. Legs are 2-by-4-inch stock and the rest of the frame is ¾-by-4-inch stock. Fasten with glue and screws. The top may be constructed as shown or made of ¾-inch plywood with a tempered hardboard top. Lumber used should be the best possible, straight, high-grade, kiln-dried birch or pine. Oil the top, stain and varnish the bottom. If you are more advanced in skill, you may wish to alter this basic design with storage drawers underneath the top, vise holders —anything that fits with your particular requirements.

*Tool panels.* Next to the workbench, the most important part of any home workshop is convenient tool panels. A template for cutting a tool rack is included in Figure 10–3. An orderly arrangement of equipment conveniently located saves many hours of hunting for the correct tools. The most important single tool panel is the one located immediately above the workbench. It should contain such equipment as rules, combination square, marking gauges, and level for layout work—and such other equipment as hammers, saws, wrenches, screw drivers, chisels, and nail sets.

*Storage.* The next step in planning your workshop is to provide storage space for small parts. To save much time and effort these various small parts must be stored separately, in easily accessible locations, and must be arranged so that each part or size is recognized at a glance. Many home craftsmen employ glass containers which make the parts instantly visible. A popular type of storage for nails and screws is the familiar screw-top jar. Many methods have been devised for holding these jars; you may prefer to place them on shelves, assorted as to content and size, or to fasten the jar lids to the underside of the shelves and unscrew the jars for removing the contents. Paints

and paint supplies must be kept free from dust and dirt—an old bookcase or china closet would be fine.

Lumber storage is another problem. Place your lumber supply high above the floor, conveniently stacked so that you may obtain the piece you want without disarranging the whole pile. The lumber should be well supported at all points, so that it does not sag and become permanently warped.

*Paint-spray booth.* This is something you will want as you become a perfectionist in finishing. It needn't be large—an area 5 feet square will handle most projects.

**Two model basement areas.** In Figures 10–4 and 10–6 are shown 2 rumpus rooms which can be built by the average homeowner. The ideas may be varied to suit your own tastes and pocket. Also, read Chapter 4 for many built-ins suitable for either living room or basement.

The basement shown in Figure 10–4 has many unique features. For instance, the accordion doors are made from ¾-inch plywood, cut to correct size. Hang each door on 4 concealed hinges and (after finishing) mount ordinary playing cards in the center of the 7-inch painted band (ordinary household cement will do the job), and then varnish them.

The concealed bookcase-cabinet on the far wall has a backing of ¼-inch fir plywood and shelves of ¾-inch fir plywood. Edges of shelves are banded with strips of hardwood molding.

The big, comfortable bench-and-back combination is easy to make. The bench rests on a 2-by-4-inch rail secured through the wall material, into the masonry. The triangular braces on the underside are spaced to fit against furring strips on the wall. The back can be hung on the wall with large, slotted keyhole hangers on each furring strip. The back and seat are each made of one piece of foam rubber, cov-



Figure **10–4** A well-designed basement room. *Courtesy of United States Plywood Corporation.*

ered with plastic or cloth, with the edges turned over and tacked. The back is secured to the board and built out to a comfortable slant.

At left is shown a snack bar. Another bar, simple to make, is shown in Figure 10–5; with its bar stools it will make a good addition to any basement.

The basement play area shown in Figure 10–6 suggests many ideas for fun and convenience that you can build or have built into your cellar. These features, designed for the entertainment of the entire family and guests, are detailed in Figures 10–7 to 10–13. There is lots of room for grown-ups and children to

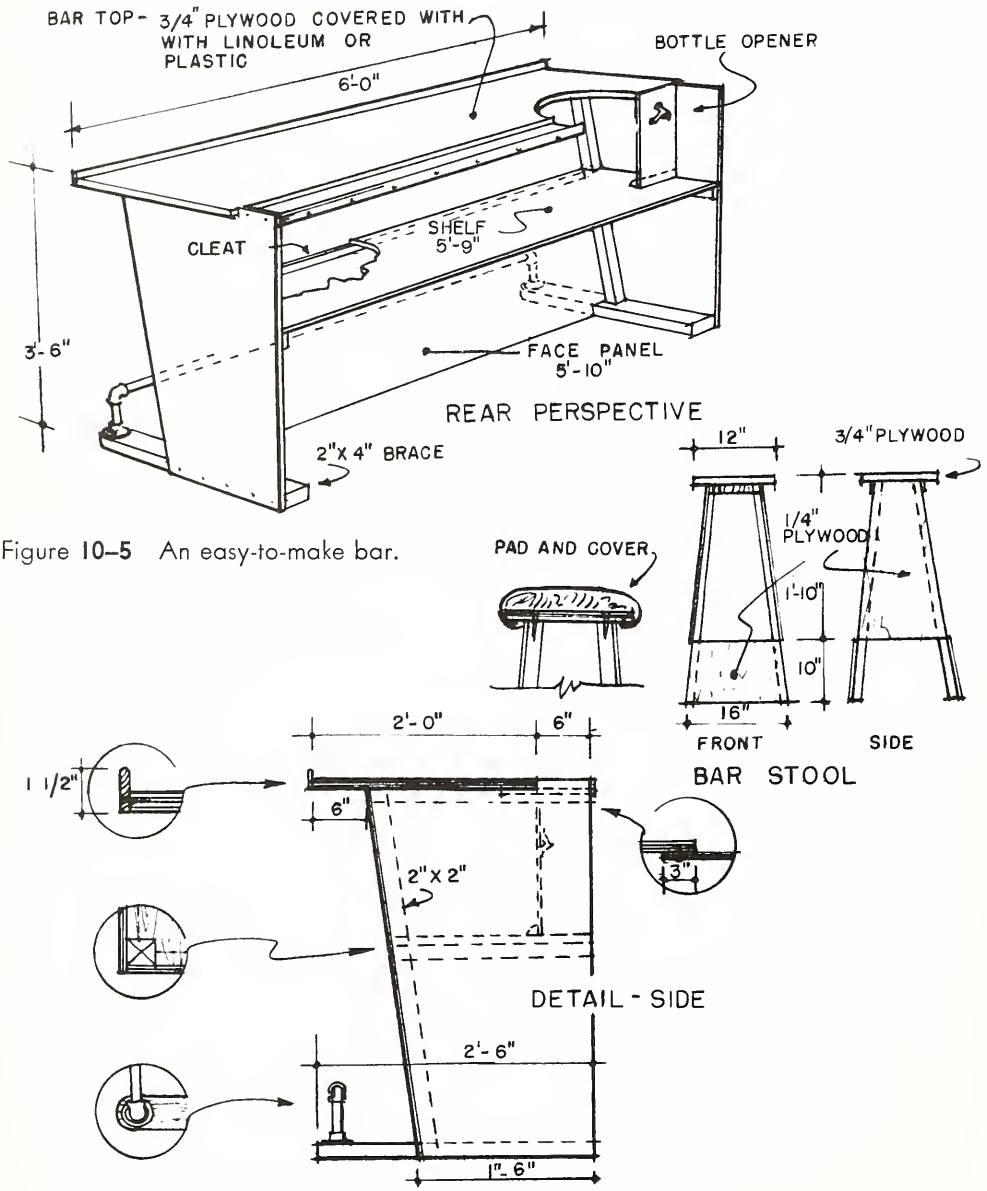
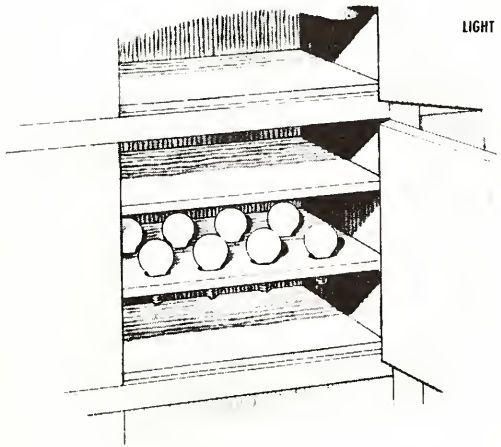



Figure 10–5 An easy-to-make bar.



Figure **10–6** A modern basement rumpus room. Construction details of the units in this room are given in Figures 10–7 to 10–13. *Courtesy of Malarkey Plywood.*

Figure **10–7** Storage wall, featuring space for folding chairs, athletic equipment, fishing gear, and small electrical supplies. The shelf with holes 1½ inches in diameter holds light bulbs securely.



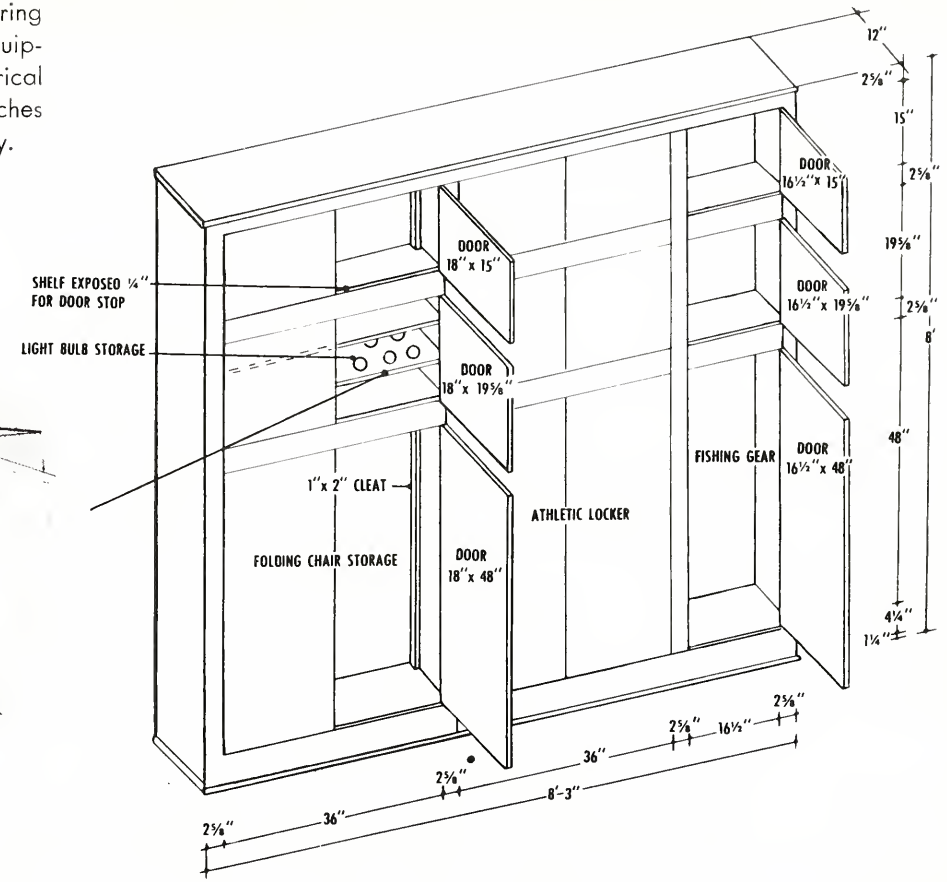
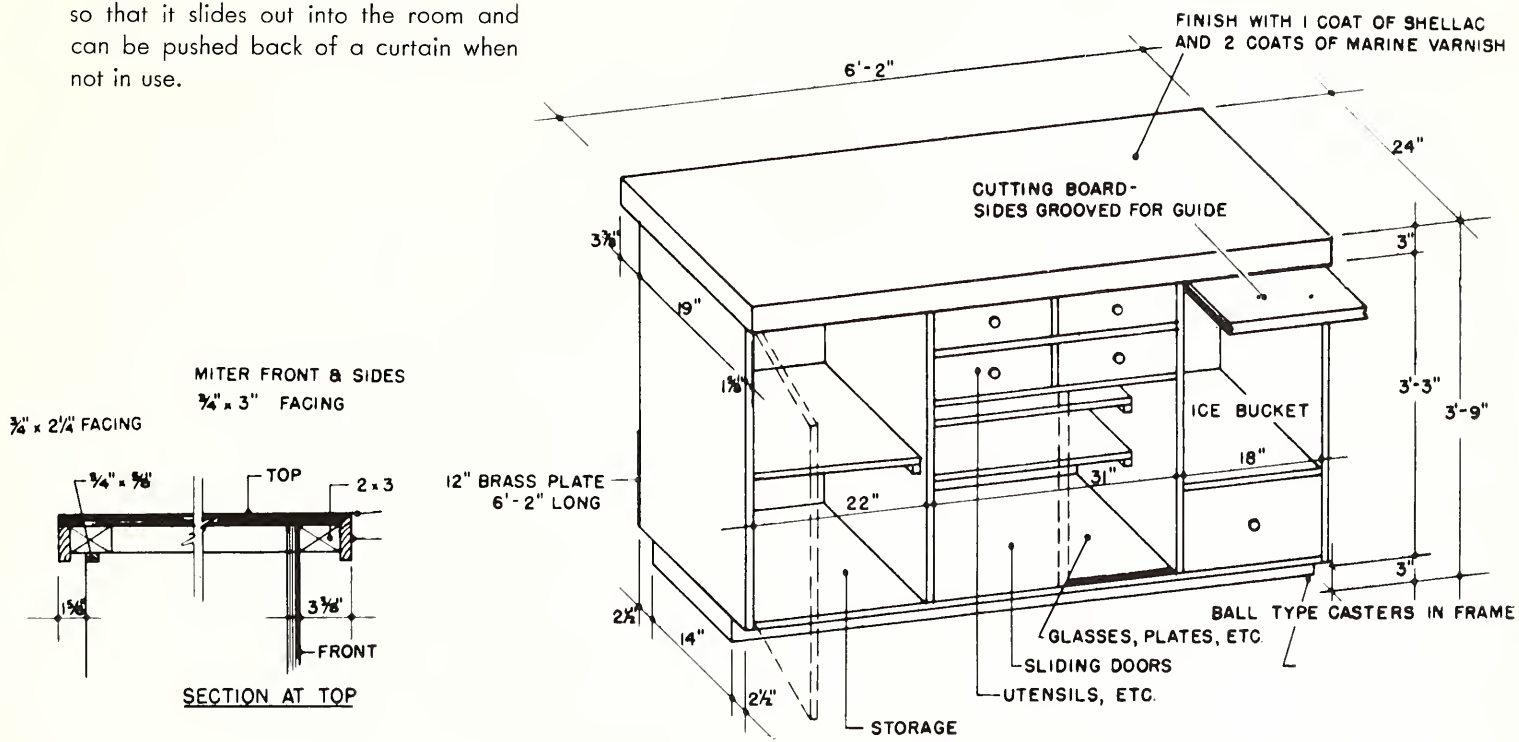


Figure 10–8 Buffet and bar, designed so that it slides out into the room and can be pushed back of a curtain when not in use.



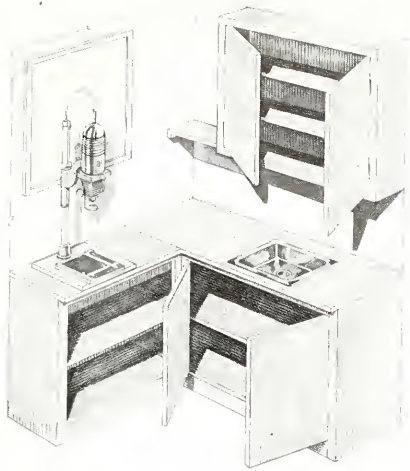
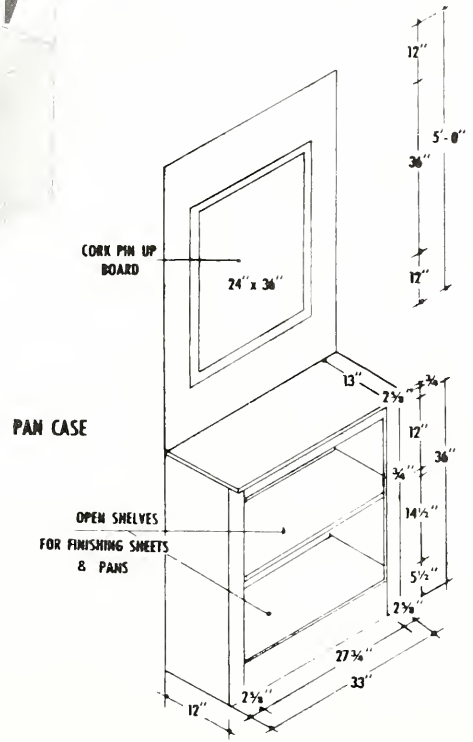
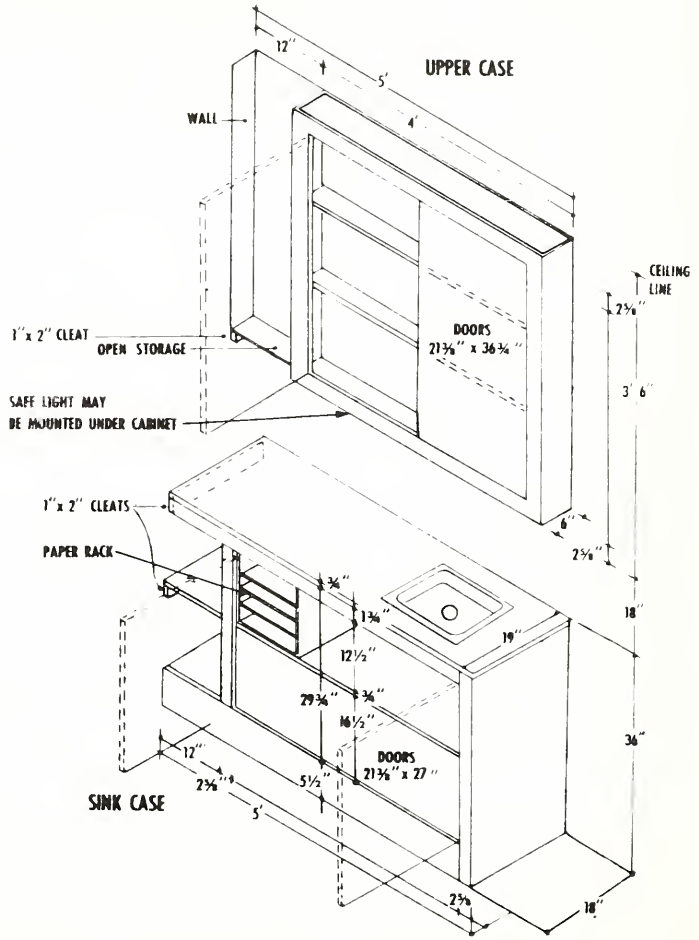


Figure 10–9 Darkroom, a compact and functional finishing room for the amateur photographer.



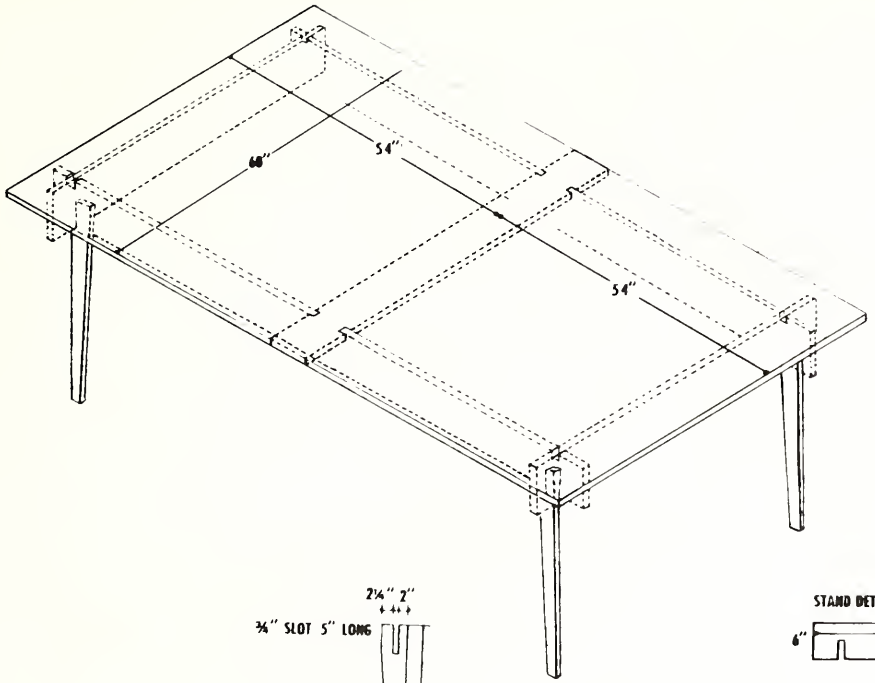
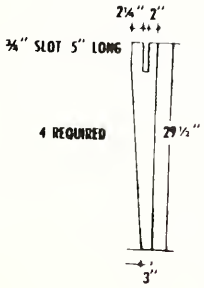
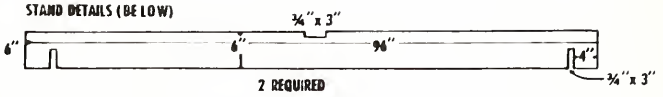
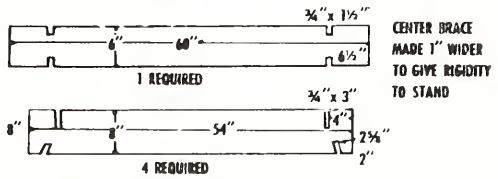



Figure **10–10** Tennis table which can be taken apart and stored out of the way. The top may be made of 2 pieces of plywood, 60 by 50 inches, or 1 piece, 60 by 108 inches; the 2-piece top is easier to handle. If exterior plywood is used the table can be used outdoors for picnics.



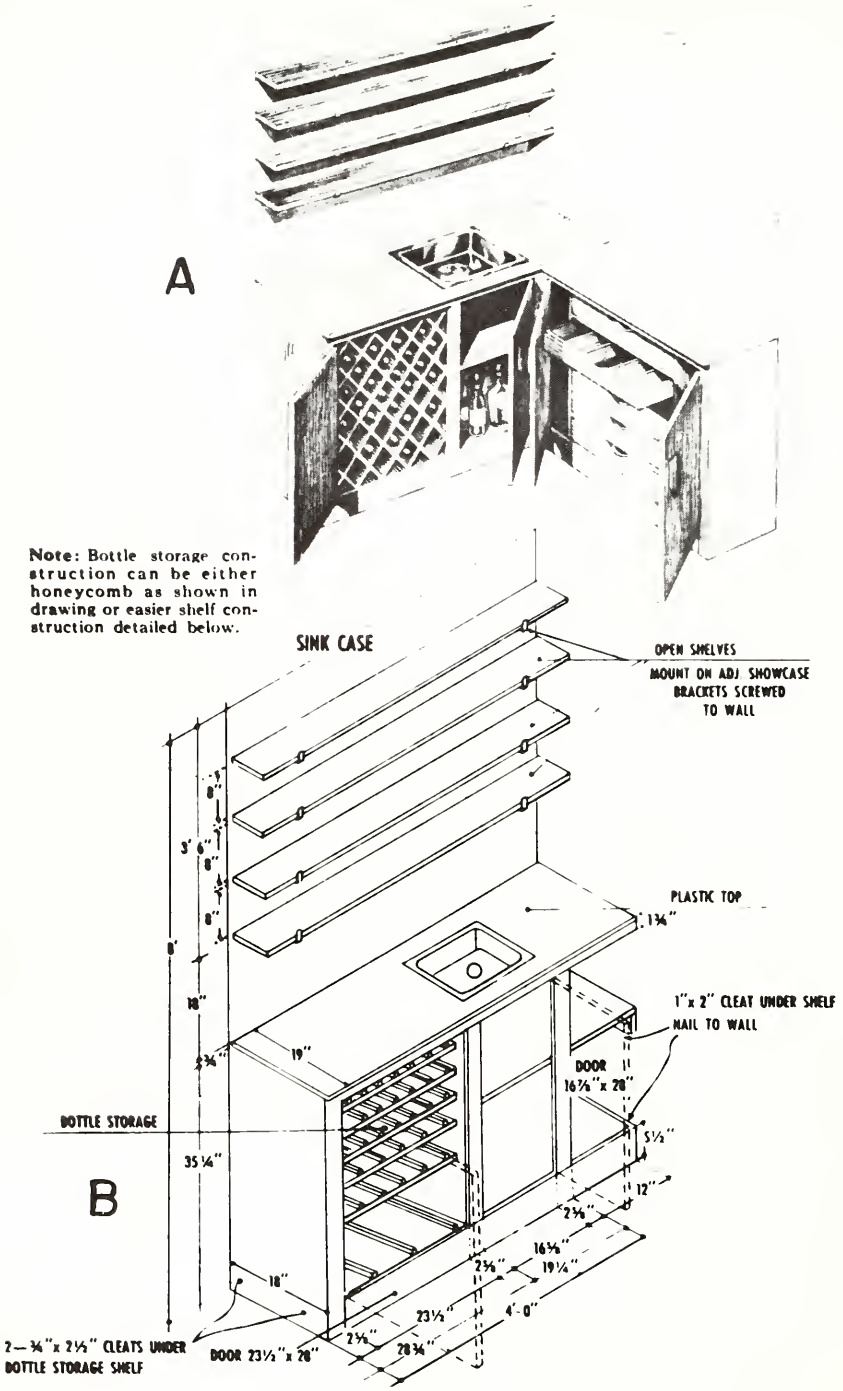



Figure 10–11 Galley, hidden by doors when not in use. The compartment for horizontal storage of bottles is excellent for wines. It may be built with honeycomb construction, as shown in the sketch, or shelf construction, as shown in the diagram; for the latter, fasten 1-by-1-inch cleats to pieces of plywood which are then mounted as shelves.

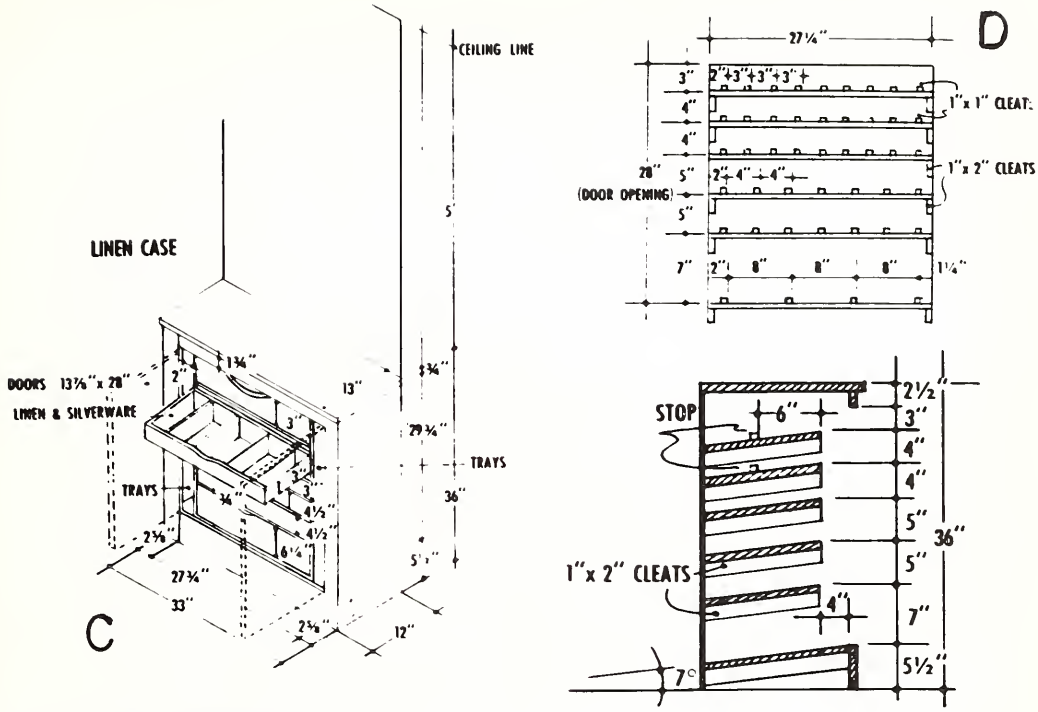



Figure 10–11 (*continued*) Diagram showing construction of galley.

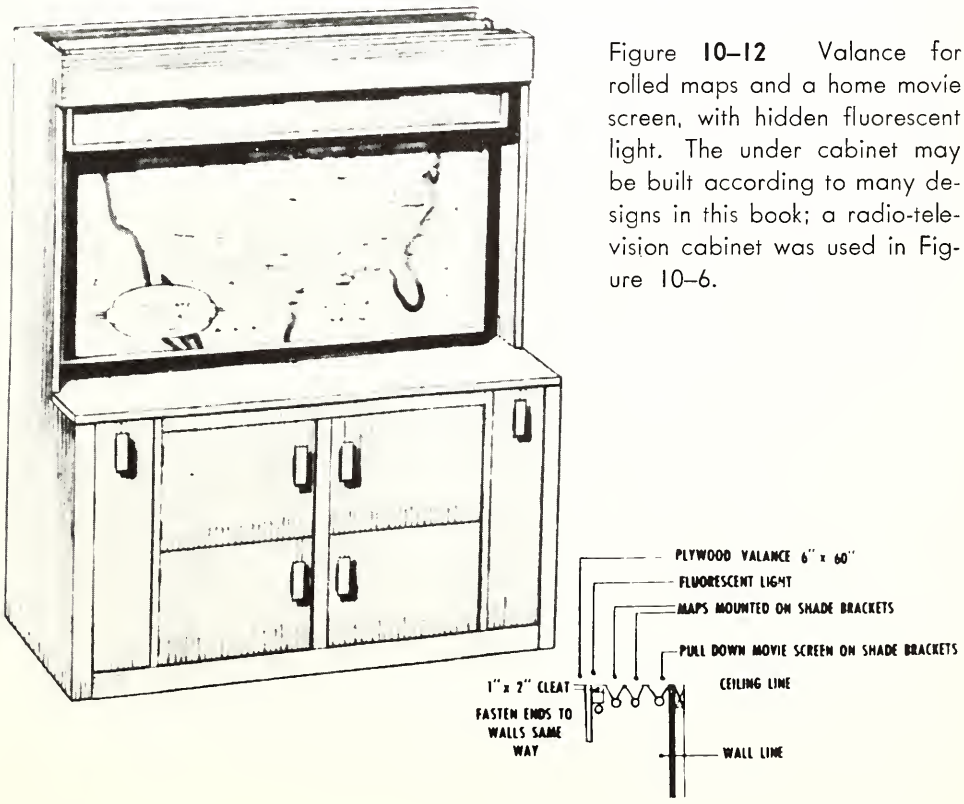
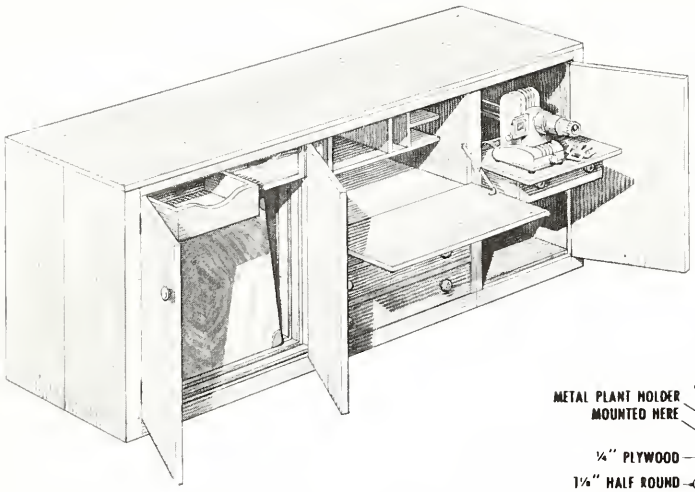
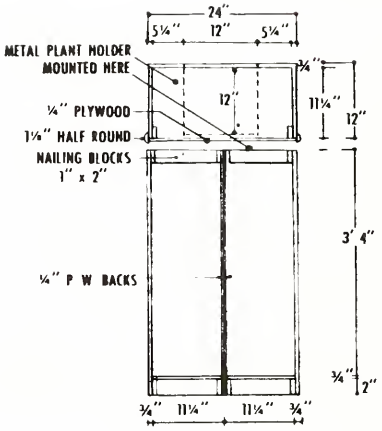
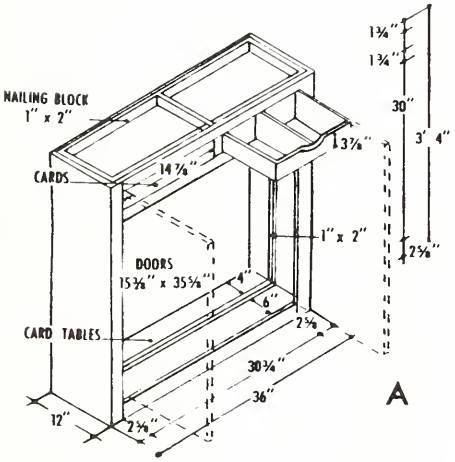


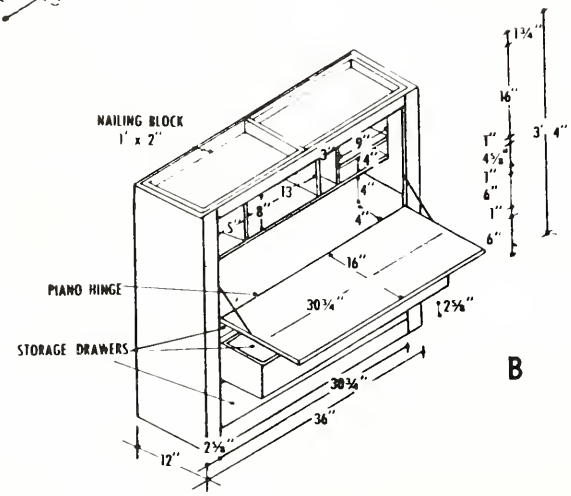

Figure 10–12 Valance for rolled maps and a home movie screen, with hidden fluorescent light. The under cabinet may be built according to many designs in this book; a radio-television cabinet was used in Figure 10–6.




24"
5¼"
12"
5¼"
METAL PLANT HOLDER MOUNTED HERE
¼" PLYWOOD
1⅛" HALF ROUND
NAILING BLOCKS 1" x 2"
¼" P W BACKS
¾"
11¼"
12"
3' 4"
¾"
2"
¾"
11¼"
11¼"
¾"


NAILING BLOCK 1" x 2"
CARDS
14⅞"
3⅞"
1" x 2"
DOORS 15⅜" x 35⅛"
4"
6"
2⅜"
CARD TABLES
30¾"
36"
12"
2⅜"
1¾"
1¾"
30"
3' 4"
2⅜"

A


NAILING BLOCK 1" x 2"
3"
9"
4"
13"
8"
5"
4"
4"
16"
PIANO HINGE
30¾"
2⅜"
STORAGE DRAWERS
30⅜"
36"
2⅜"
12"
1¾"
16"
1"
4⅛"
1"
6"
1"
6"
3' 4"

B

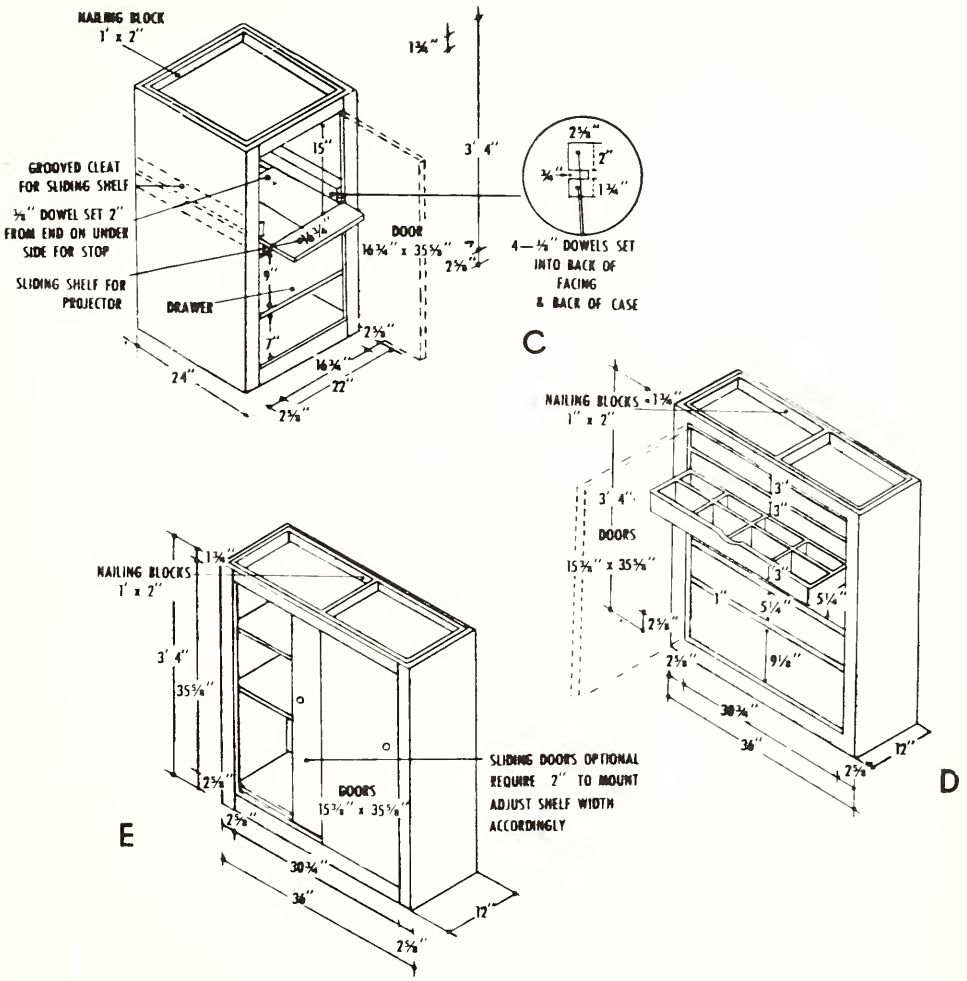



Figure **10–13** Storage island, shown in Figure 10–6, made of sectional units joined together and covered with a plywood counter. Any units you choose may be used in this way (see Chapter 4). Those shown above are: (*A*) An entertainment·cabinet which holds card tables, and also games, cards, poker chips, etc. (*B*) A child's desk with fold-down writing surface, drawers, and cupboards. (C) A projector and film cabinet, which keeps the projector stored away but plugged in, ready to slide out and show pictures. (*D*) A hobby cabinet. (*E*) A children's cache, which allows the children to collect anything from bottle caps to comic books without disrupting order in the rest of the house.

entertain. If desired, even the storage island is mobile and can be rolled out of the way to make more room. A movable galley is neatly arranged and equipped for serving refreshments. The photographer, model-plane builder, or junior geologist has a place to enjoy his or her hobby without disturbing anyone or being disturbed. There is also storage for many extras which you like near at hand but out of sight.

# CHAPTER 11

## CLOSET AND STORAGE PROBLEMS

AMERICAN housewives have voted inadequate closet space as their pet peeve. To meet their requirements, efficiently planned closets and more adequate storage space are the rule in newer homes. Older houses, built when the size of a closet depended on how much space was left over, are the ones that now demand attention. You may not be able to do extensive remodeling to provide more closets, but with a little ingenuity and time, you should be able to increase the value of your present house by improving its facilities and equipment.

There are 3 things one must consider when planning closet space—location, size, and equipment. Location is already taken care of in the majority of homes, and unless you are able to relocate storage spaces, you will have to rely on changing their size, or rearranging and modernizing their equipment. However, the interior arrangement and intelligent use of all available space in a closet is often all that is necessary to transform a bad closet into a good one.

This chapter presents typical plans for closets and storage spaces. For each plan, basic dimensions are given and a satisfactory arrangement of fittings suggested, but they may easily be adapted to suit individual cases. The length of the rod, the number of hooks, the amount of shelving, and the arrangement of the fittings should be suited to your needs. For a closet that will be used by different persons from time to time, adjustable fittings are convenient. If you are changing the size of a closet or building a new one, measure your belongings and plan the space for the type and quantity of material it is expected to accommodate. For instance, 3 suits, 2 overcoats, and a couple of odd pairs of trousers will require an area 22 inches square.

Closets and other storage arrangements should occupy space that would not be used in other ways whenever such space is of adequate size and in a desirable location. Closets should not interfere with main areas of activity in a house. They should be accessible but inconspicuous.

Modern homemakers are not satisfied with clothes closets that are merely places to hang things. They want closets to be well arranged so that they help keep clothing in good condition and make it easy to get garments out or to put them away.

Ventilation is especially important in clothes closets to help keep the clothing free from odors and, in humid areas, to keep mold from developing on them. Air may be kept in circulation by a window or by openings in the top and bottom of the door.

One clothes closet in the house should have doorways equipped with rubber or felt gaskets and a tread. This make it possible to shut the door really tight in case it is necessary to fumigate against moths. Shallow "reach-in" closets need doors that are almost as wide as the

closet itself. For doorways more than 2 feet 8 inches wide, double or sliding doors are recommended.

In dusty parts of the country a threshold is needed for "walk-in" closets to help keep the contents clean. The floors of "reach-in" closets should be built at least 2 inches higher than the floor of the room so that dust will not seep in so freely.

**Closet plans.** No matter what the shape of the space available for a clothes closet, 1 of the 6 plans in Figure 11–1 can be

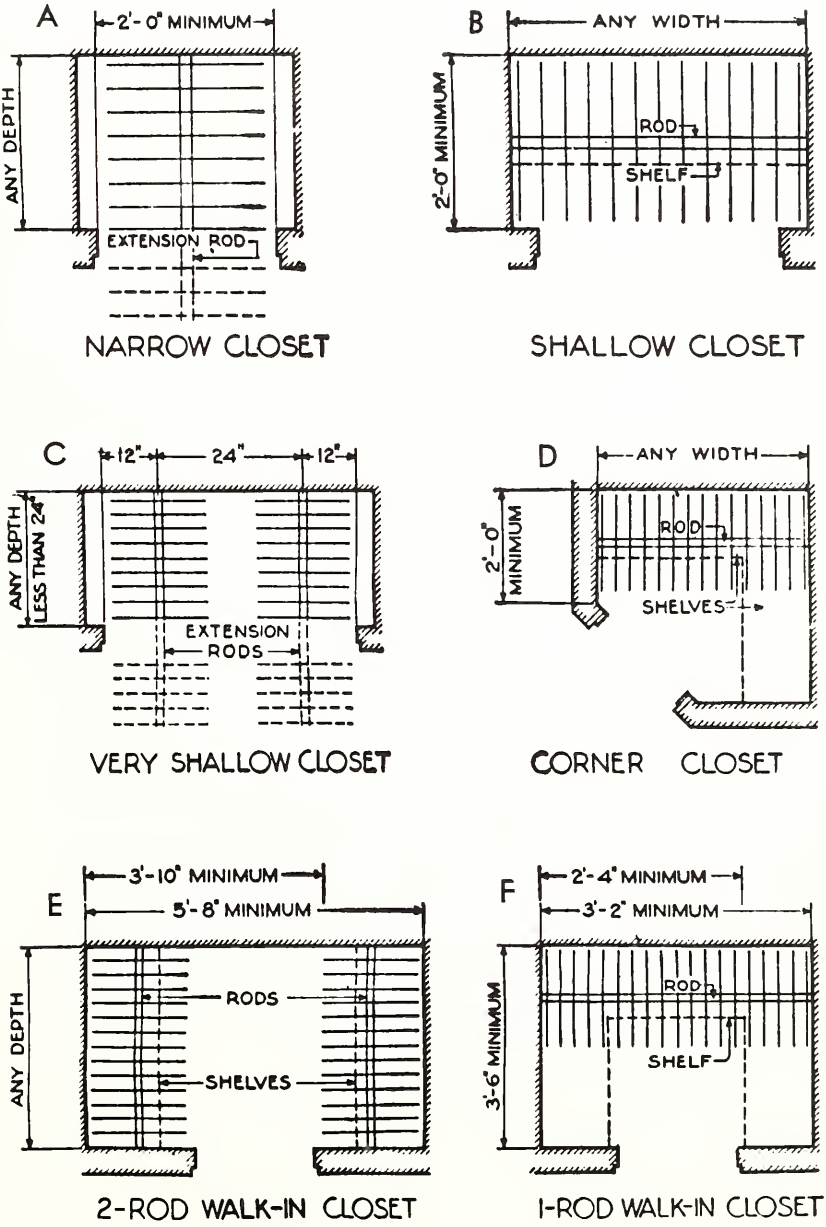



Figure 11–1 Six plans for clothes closets.

adapted. Minimum dimensions marked on the plans may be increased and the arrangement then varied by adding hooks, trays, shelves, drawers, and racks for shoes. Clothing on hangers is indicated by the lines drawn at right angles to the rods.

For a space limited as to width but fairly deep, the narrow closet (*A*) with extension rod is a good arrangement. The doorway to this closet should be at least 2 feet wide.

The shallow wardrobe closet (*B*) is a typical reach-in arrangement. This is an excellent closet to use when depth is limited. However, the depth should be at least 2 feet so that clothes on hangers will not brush against the walls. This closet requires an opening practically as wide as the closet.

For space that is too shallow to place hangers crosswise, closet (*C*) is a good arrangement. Here 2 extension rods provide the maximum hanging space. The doorway must be practically as wide as the closet.

The corner closet (*D*) provides considerable hanging space for very little floor area. This closet has no sharp corners that project into the room.

The walk-in closet (*E*) may be any depth. For more shelf space and less hanger space, one side of the closet may be filled with shelves.

Another walk-in closet (*F*) is similar to the reach-in arrangement shown in (*B*). This closet may be any width that is wider than the door opening. If desired, place the door at one end, making the shelf L-shaped.

**Fittings for clothes closets.** It pays to plan details of closet fittings carefully. Rods, hooks, and trays that are well located make it easier to keep clothing in good condition and to keep the closet in good order. Practically all clothing—dresses, except those for infants, skirts, blouses, trousers, and coats—can be taken care of on hangers.

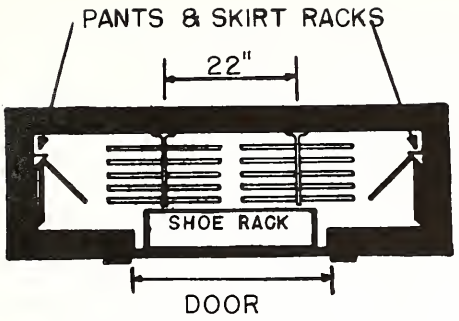
ROD ALLOWANCE FOR ADULTS' GARMENTS

| Garment | Space allowance on rod (inches) | Minimum distance from floor to top of rod (inches) |
|---|---|---|
| Skirts | 2 | 45 |
| Jackets | 3 | 45 |
| Shirts | 1½ | 45 |
| Suits | 3 | 45 |
| Trousers | 3 | 72 |
| Dresses | 1½ | 63 |
| Men's overcoats | 4 | 63 |
| Ladies' coats with fur collar | 3–6 | 63 |
| Ladies' coats without fur collar | 2–5 | 63 |
| Evening gowns | 2 | 72 |
| Garments stored in mothproof bags | 3–8 | 72 |

*Rods and brackets.* If the closet is 22 inches or more in depth, and wider than it is deep, the most practical arrangement for hanging garments usually consists of a clothes pole of either metal or wood. The table printed above shows the space to allow on the rod and from floor to rod for different types of garments. (For children's clothes, see page 124.) The space between wall and rod should be at least 12 inches, so that clothes may hang freely on the hangers. If there is a shelf above the rod, a minimum of 2½ inches should be allowed between the top of the rod and the bottom of the shelf. When attaching equipment, keep these figures in mind.

For shallower closets, install brackets similar to the type illustrated in Figure 11–2. These brackets are 8, 10, and 12 inches in length. By spacing them 2 feet apart along the rear closet wall, space usually wasted is put to use.

If you are dealing with a "hole in the



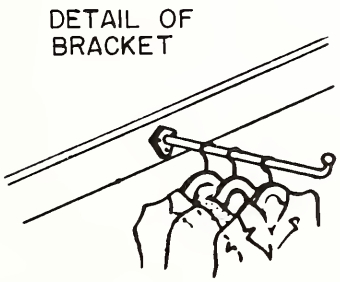




Figure 11–2 Bracket suitable for a shallow closet.

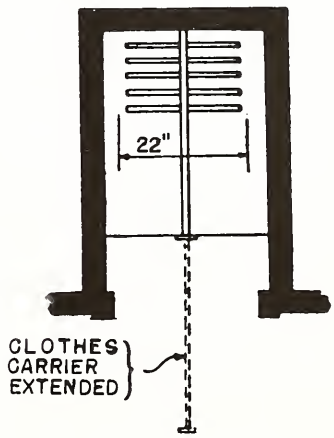
wall" closet (one that is deep and narrow), you should have an extension pole so that the rod can be pulled out into the room. Use a type similar to the clothes carrier illustrated in Figure 11–3. This gadget, consisting of a permanent track attached to the underside of the closet shelf, permits a movable arm to slide in and out on ball-bearing rollers. Instead of groping in a dark, narrow closet to find a particular garment, you can bring your wardrobe out into a well-lighted room by a slight pull on the handle.

If only a few garments are kept on hangers, as in closets for work clothes, a long hook may take the place of a rod.

*Hooks.* There should be enough hooks in a closet to accommodate nightgowns, pajamas, slips, aprons, overalls, and other garments that do not belong on hangers. Children's play suits and jackets and men's work clothes are also generally kept on hooks.

Hooks should be within easy reach of the doorway but not any closer than 5 inches. There should be a minimum allowance of 4 inches between the top of a hook and the bottom of the shelf above it. It is better not to place hooks behind a rod. For the clothing of small children, hooks should not be above the child's eye level. Hooks for garments on hangers cannot safely be put on a door that is less than 30 inches wide.

The distance from hook to hook or from hook to corner will vary with the kind of garments hung on them. For clothing ordinarily kept in a bedroom closet there should be a minimum of 7 inches between hooks and 3½ inches from



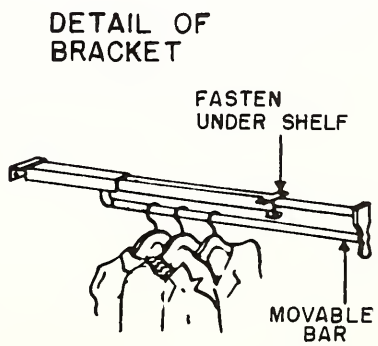




Figure 11–3 Clothes carrier, or extension rod, for a narrow closet.

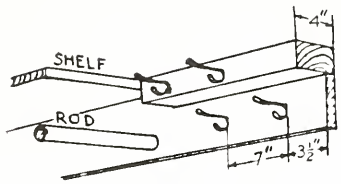



Figure 11–4 Space-saving method of placing hooks.

hook to corner. For children's clothing, have hooks spaced about 9 inches from hook to hook, and 4½ inches from hook to corner. For men's bulky work clothes the hooks should be at least 12 inches apart and 6 inches from hook to corner.

A space-saving method of placing hooks is shown in Figure 11–4. Hooks in the upper row are on a strip that sets them out from the wall about 3 inches more than the hooks in the row below. This method cannot be used behind a rod unless there is extra space between rod and wall. The upper hooks, with clothing, will extend about 8 inches out from the wall—the lower ones about 4 inches.

*Shoe storage.* There are several convenient ways to store shoes. The upper rack shown in Figure 11–5 holds shoes vertically, and is a good one to use when wall space is not so limited as floor space; the lower bar may be covered inside with felt to protect the shoes. The tilted rack shown below may be used on the floor of the closet, below garments on hangers or hooks. A width of 18 inches will accommodate at least 2 pairs of shoes and sometimes 3, depending, naturally, on their size.

Horizontal shelves, one above the other, are also satisfactory for storing shoes. They take up more room than the arrangement shown, but they have the advantage of being useful for other purposes. Distance between shelves for storing adults' shoes should be at least 7 inches, for children's shoes 6 inches.

*Shelves.* Other fittings should supplement the storage space provided in bureaus, chests, and dressers. Clothing shelves for folded clothes are less expensive than trays or drawers and provide enough protection for most articles. The width and distance between shelves (as well as the depth of trays and drawers) varies according to the articles stored. They should be planned to accommodate the largest articles commonly stored in or on them. The minimum for shelves for hats, for instance, is 12 inches from front to back—the maximum about 15 inches. The distance between shelves used for hats should be 9 inches from the top of the lower shelf to the bottom of the shelf above.

*Door storage units.* If your closet is over 2 feet 4 inches deep, there remains an unused space of 6 inches or more between the inside of the door and the clothing. By putting the closet door to work, you gain the equivalent of another wall. Here may be stored umbrellas, even when wet, and here is space for extra hats that will not fit on the shelf. This is also a convenient storage place for shoes and

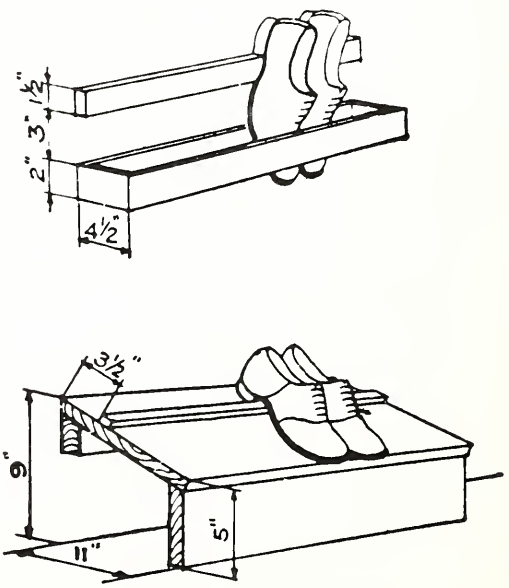



Figure 11–5 Two types of shoe racks.

neckties. How much better it is to get the shoes out in the open, instead of on crude racks at the back of the closet, which the victim must approach on his knees while he wades through a wall of clothes!

Figure 11–6 shows 2 units that can be built on the inside of a closet door, the upper being designed especially for hats.

Storage can be facilitated also by the many types of accessories on the market, designed to care for umbrellas, coats, hats, neckties, shoes, trousers, and such items.

**Coat closets.** The coat or guest closet, generally a hall closet, takes care of every article of outdoor wearing apparel from rubbers to hats. Its efficiency relies a great deal on the arrangement of its equipment. Door storage is particularly useful.

The coat closet should be placed near the main entrance, but not so close to it that doors interfere with access to the closet. When considering the amount of space required, remember that a pole about 26 inches long can easily accommodate 6 overcoats; an overcoat on a hanger needs a 24-inch space (22-inch minimum).

A shelf proportioned to the depth of the closet may be fastened just above the clothes pole on brackets. If possible, 2 shelves should be installed: an upper shelf, for caps and hats, 14 inches from front to back; and a lower shelf, for gloves and mittens, 12 inches deep and 12 inches below the upper shelf.

*Island entry closet.* Figure 11–7 shows a free-standing island entry closet. It serves the storage needs of both entry hall and living room, and defines living and entry areas without confining either. And because it replaces the conventional wall needed to screen the living room from the front door, this modern built-in more than pays for itself. The side which faces on the entry hall has a roomy clothes closet and deep sections for bulk storage; on the other side are cabinets and a built-in counter. If you live in an older home, with a too-large living-dining room, you can make good use of this island wall to define the dining area. Dimensions can be easily altered to meet your requirements.

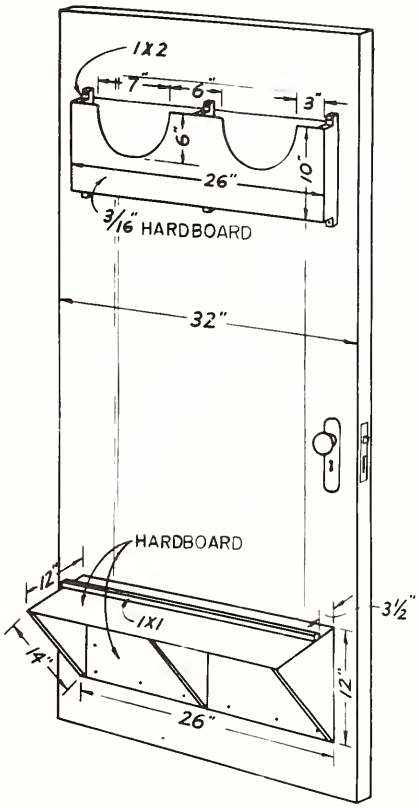



Figure 11–6 Storage units on a closet door, suitable for hats (*above*) and shoes (*below*). *Courtesy of Masonite Corporation.*

**Chore-clothes closet.** Figure 11–8 shows a closet designed to accommodate chore clothes. It should be located near the rear entrance or in the basement. A long hook, 68 inches from the floor, provides space for a few coats on hangers. Other coats and jackets may be kept on hooks set 12 inches apart under the lower shelf. If the closet is used by grown-ups only, 55 inches from the floor is a good height

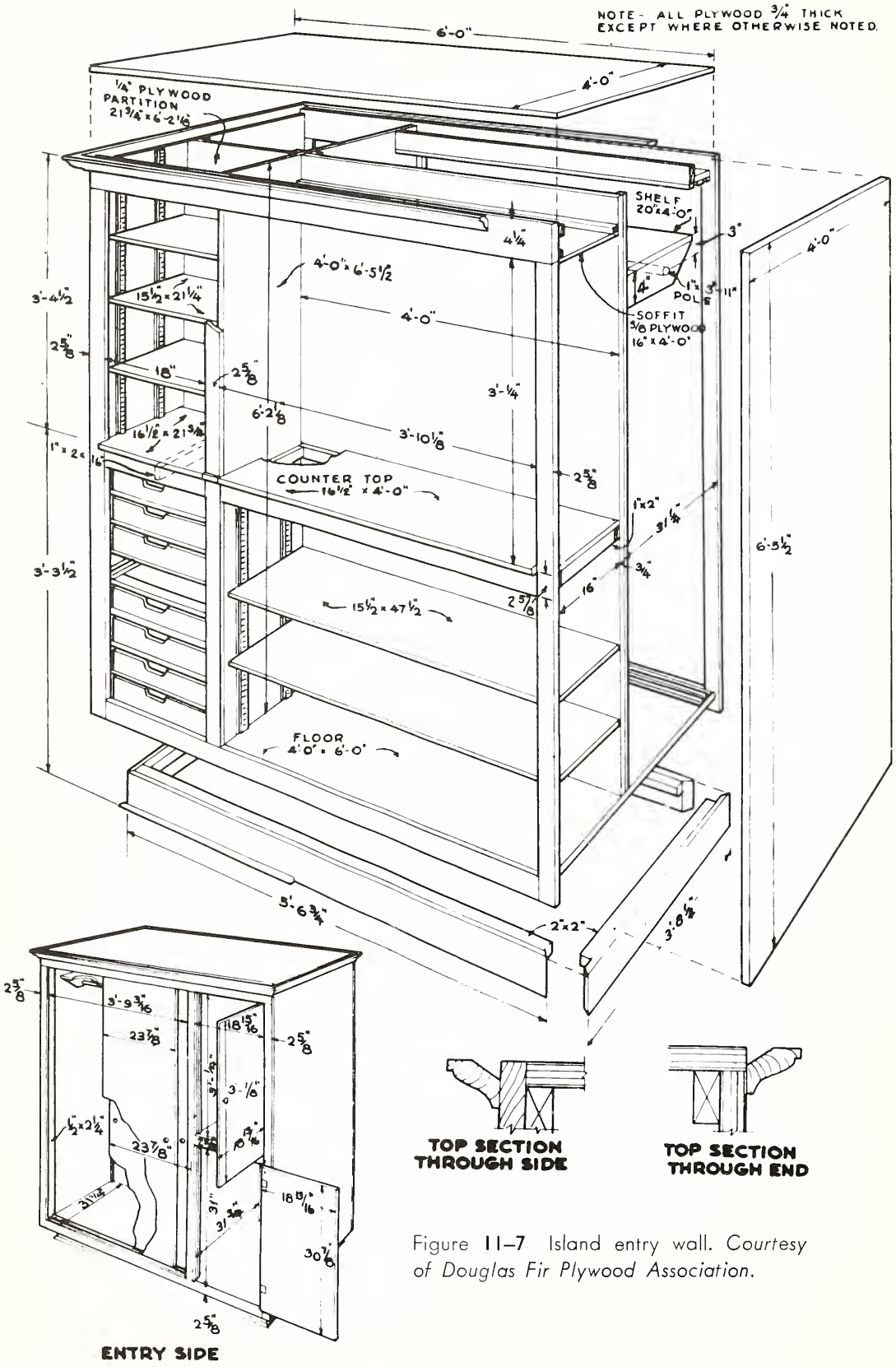
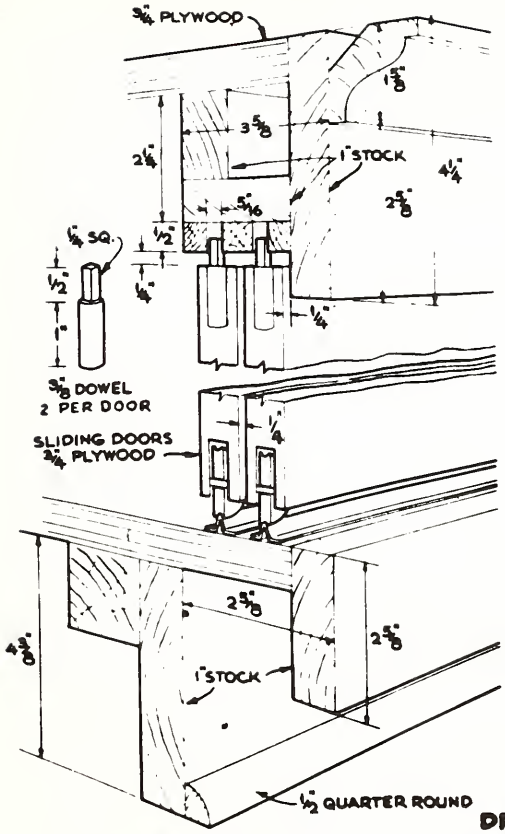
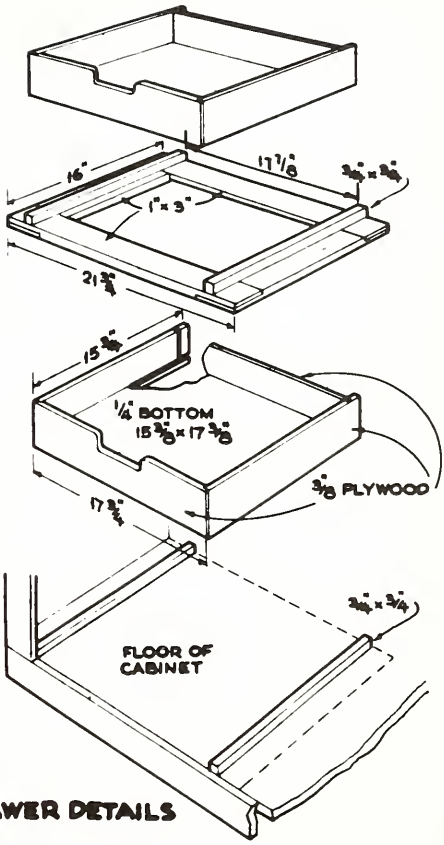


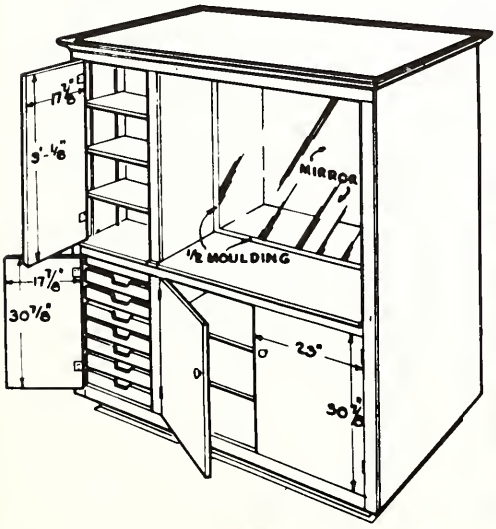

Figure 11–7 Island entry wall. *Courtesy of Douglas Fir Plywood Association.*



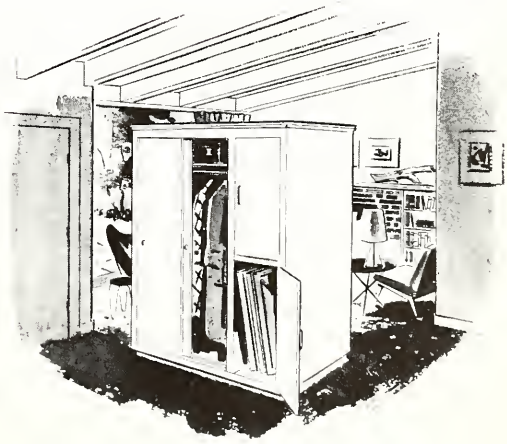

SLIDING DOOR DETAIL




DRAWER DETAILS




ROOM SIDE



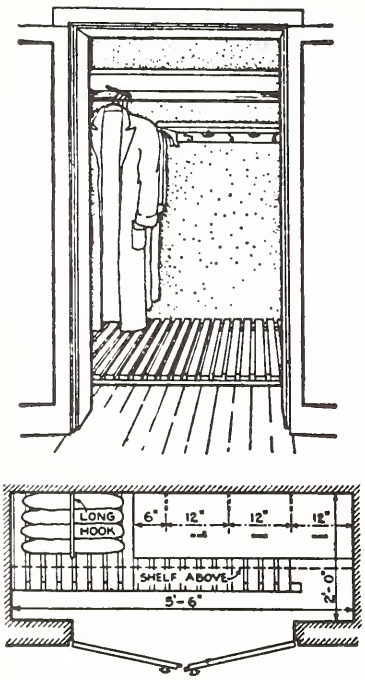



Figure 11–8 Chore-clothes closet.

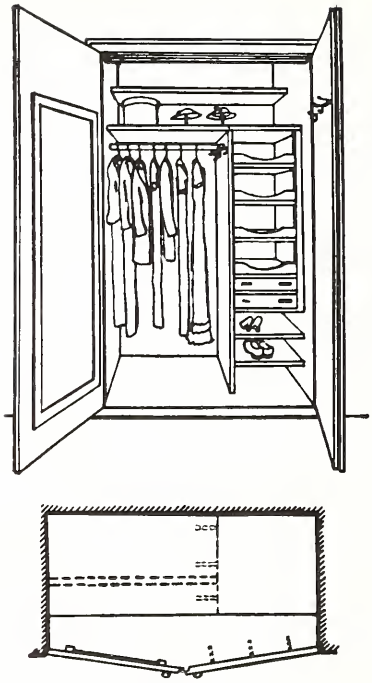


Figure 11–9 Basic bedroom closet.

for these shelves; if children use this closet, about 48 inches from the floor is preferable. A rack made of slats keeps muddy boots and shoes off the floor underneath.

A ventilated chest either in the closet or in the rear entry also makes a good storage place for shoes and boots.

**Bedroom closets.** One closet in every bedroom is the minimum for modern homes. Ideally, there should be a separate closet for each person or, if 2 must share a closet, a separate rod for each. Two feet of rod length is about the minimum to allow for each person. Built-in wardrobes for bedrooms are discussed in detail in Chapters 6 and 7. The discussion in this section concerns those closets already made. Though you probably will not be able to enlarge your closets you can increase their usefulness by installing the most suitable type of fittings, as described above.

A basic bedroom closet is shown in Figure 11–9. In this closet a rod provides 24 to 27 inches of hanging space. The tops of both the rod and the hooks on the closet door are 63 inches from the floor, a good height for the garments of most adults. Just above the rod, 65½ inches from the floor, is a shelf 18 inches from front to back. The second shelf above the rod is narrower and may be omitted if height is limited.

On the right-hand side is a section of shelves and drawers, 18 inches wide. The 2 lowest shelves, for shoes, are spaced 7 inches apart. The 2 drawers, for ties, handkerchiefs, and toilet articles, are 4

inches deep. The 4 movable shelves, for folded articles, are spaced 9 inches apart and have guards on the front to keep articles from falling off.

One of the closet doors is a handy place to put a full-length mirror. The top of a full-length mirror for the use of adults should be no less than 5 feet 11 inches from the floor. (See page 114 for mirror installation details.)

**Linen closets.** The most desirable location for a linen closet is near the bedrooms and opening directly into a hall. In addition to household linens, this closet may accommodate enough surplus supplies of bedclothing to take care of emergency needs. If woolen blankets are stored here during the season of danger from moths, each one should be so wrapped as to be mothproof.

Families that have extra supplies of woolen blankets and comforters should store them in mothproof containers when they are not in constant use. Some families have a large chest or a specially constructed closet for storing woolen clothing and blankets out of season.

The number of shelves needed in a linen closet varies from family to family. Therefore it is a good idea for each woman to determine the amount of storage space needed by measuring her own supplies. It is wise to make shelves adjustable to allow for changes in kind and number of articles to be stored. Drawers or trays add to the convenience of linen closets, but they increase the cost of construction.

Surprisingly little depth is necessary for a successful linen closet. For instance, large bath towels and bath mats will need a shelf no more than 18 inches deep, sheets require 14 inches, pillow cases and hand towels 8 to 12 inches. Only blankets demand a greater depth. If your closet is too deep, you will find it very awkward to reach over one or more rows of towels to get at an article tucked away back in the gloom. Any practical homeowner can remedy this situation by putting the door to work and making it support half of the shelving.

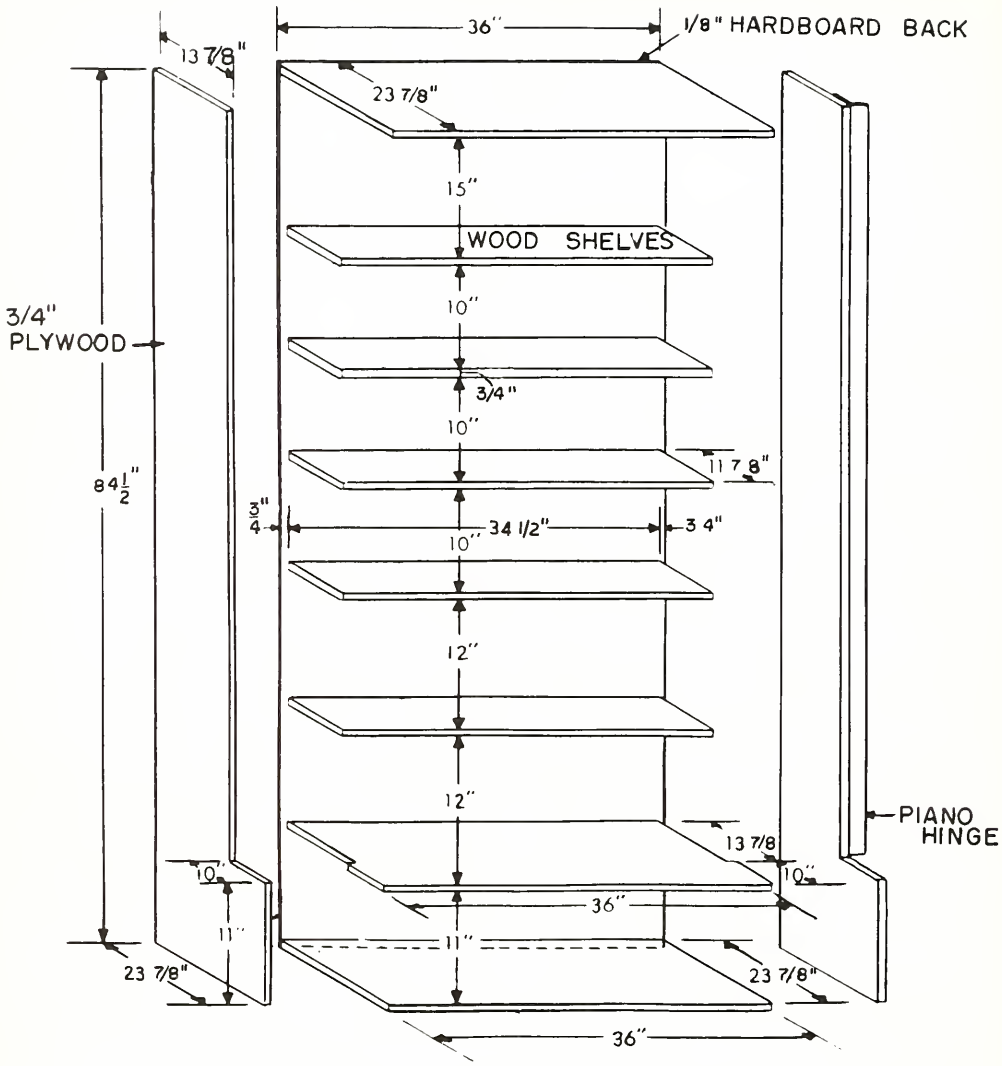
This shelved-door construction is included in the built-in linen closet shown in Figure 11–10. Cut the shelving from ordinary ⅞-inch pine stock. The shelves are supported by 2 vertical end supports fastened to the door stiles by small metal brackets. Guards made of 1-by-3-inch boards may be used to keep the linens in place when the door swings; one bar is placed ¾ inch and the other 1½ inches above the shelf. For appearance's sake keep the door shelving in line with the closet shelving wherever possible, and remember to allow for necessary clearance when the door swings open. Do not make door shelves too deep or they will become heavy and clumsy, both in appearance and in operation. If you reserve them for guest towels, wash cloths, and hand towels, for instance, you can use a depth of only 8 inches.

**Housekeeping closets.** It costs very little to make a serviceable closet for cleaning supplies. Such storage space helps to keep the house sightly and prevents the odors of wax, polishes, and soaps from spreading.

The inside walls of the cleaning closet should be smooth and impervious to oil. Plaster walls, enameled or covered with linoleum or oilcloth, or wallboard painted with enamel are satisfactory linings. If the floor of the closet is raised about 2 inches above the room floor, lint is less likely to come in under the door.

There should be space in a cleaning closet for brooms, brushes, mops, and, if possible, the vacuum cleaner. This closet is also a good place to keep extra table leaves—in a special case with spacers.

In determining the dimensions and the



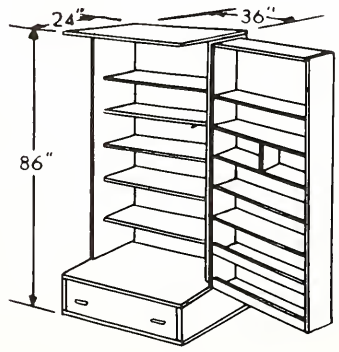
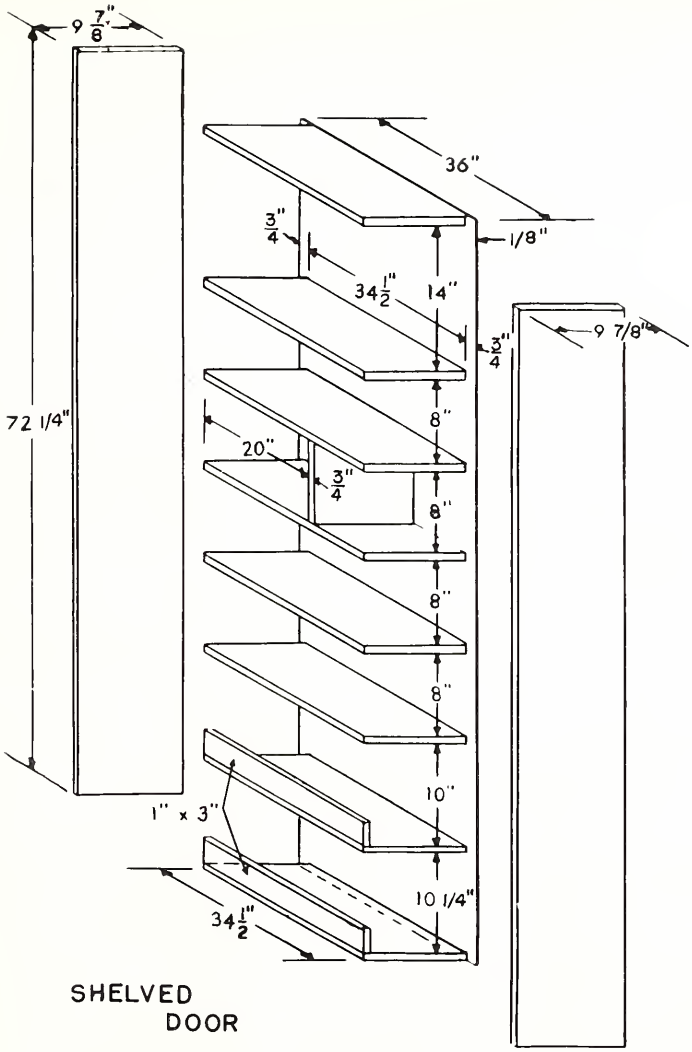
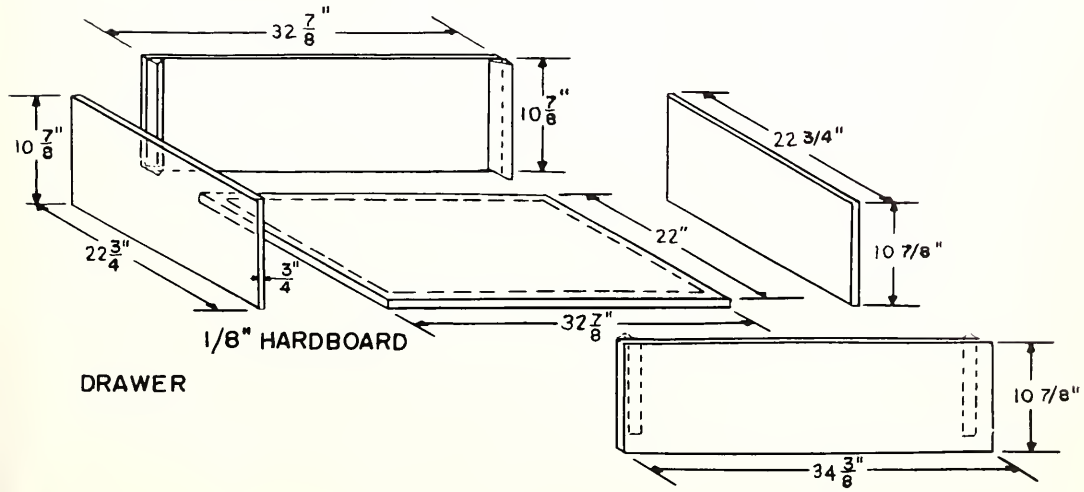




Figure **11–10** Built-in linen closet with shelved door. *Courtesy of United States Gypsum Corporation.*




SHELVED DOOR




1/8" HARDBOARD

DRAWER

arrangement of a cleaning closet, take into consideration the articles to be stored and the way in which they must be stored. Each article that hangs should have space enough to hang free. And it should be possible to remove any article without first taking out something else. A floor area 18 by 30 inches will be sufficient to accommodate an upright vacuum cleaner with a broom and a mop or two, but an area at least 2 by 2 by 6 feet is far preferable.

Locate the closet so that it is convenient to the kitchen and within easy access to the rest of the house. Two good locations are between kitchen and hall and between kitchen and dining room.

The brooms and mops can be stored neatly and efficiently by attaching friction catches about 4 feet from the floor to 1-by-3-inch pieces nailed on the side walls. Here, again, the door may be put to work to hold miscellaneous brushes, dust cloths, and bags.

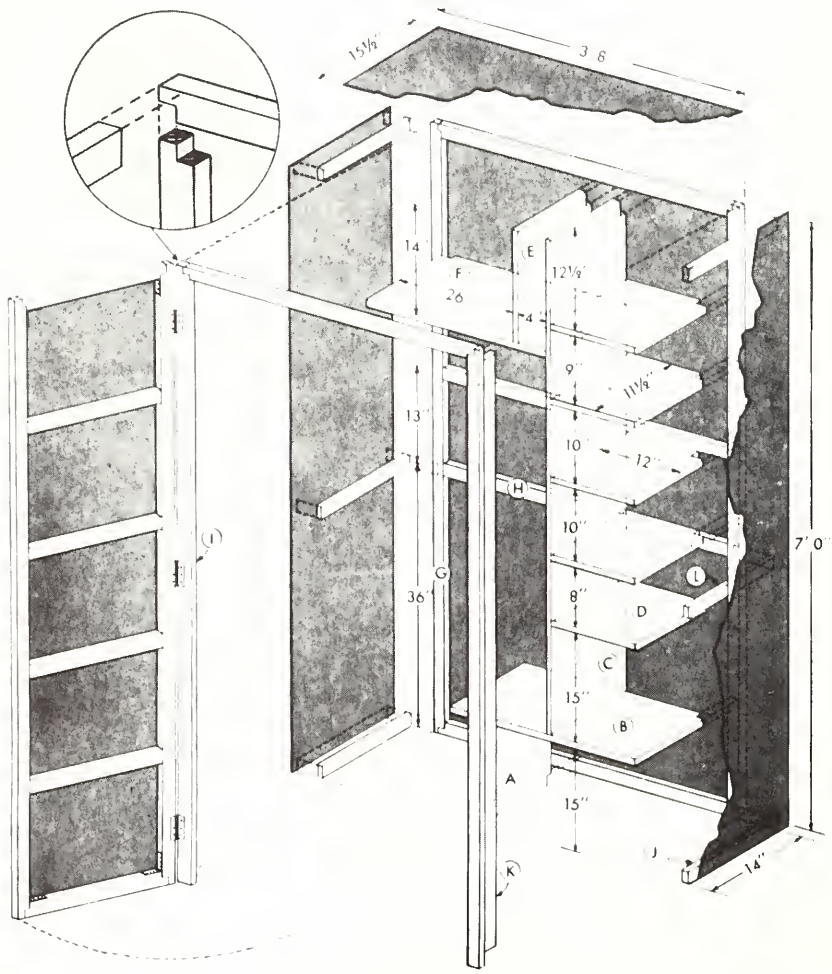



Figure 11–11 Housekeeping closet. *Reprinted from* Popular Home—*United States Gypsum Corporation.*



Figure 11–12 Household closet, featuring the use of perforated hardboard. *Courtesy of Masonite Corporation.*

Allow sufficient clearance between the lowest shelf and the top of the vacuum cleaner or broom, whichever is higher; usually this shelf is about 5 feet from the floor. Here you can store miscellaneous bottles and cans. Allow a 15-inch distance between this shelf and the one above. The top shelf may be used for storage of future dust cloths and sundry articles seldom used.

The built-in housekeeping closet shown in Figure 11–11 is built by working from inside out. Start with shelf assembly A to F inclusive. On 1-by-12-inch stock lay out all pieces and cut to size. Notch corners after all pieces are cut. The easiest and most accurate way of cutting corner notches (for letting in frame) is to turn all pieces on edge and clamp face to face, with edges exactly flush; then mark and saw notches from all pieces. Next, with 6*d* finishing nails, nail shelf support A to shelf B, making sure that notches face down. Nail shelf B to support C. For ease of working, lay assembly on floor with notched edges down. Nail shelf F to shelf support C. Continue nailing shelves to support C. Complete shelf assembly by adding divider E to shelf F.

To construct frame G, use the same method of cutting notches as in shelf assembly. Then nail brace H and hook strip. Nail frame G to shelf assembly, fitting rails and stiles in notches as shown. Frame I is similar to rear frame G, but without lower rail. A stiffening member K is nailed to I to give added strength. Note that K is 3¼ inches shorter than I to allow for 2 rails J. Connect the 2 frames by means of side rails J and middle brace L, which is toenailed. Hardboard is used for top, bottom, and sides. Use ¾-inch finishing nails every 6 inches or so in attaching the hardboard, first coating the framework with glue. Set nailheads and fill holes.

Figure 11–12 shows another arrangement of household items in a closet.

A closet under the basement stairs is an ideal place for household items. (See Figure 11–13.) Most homes have basement steps that waste all the space underneath. With a few big plywood panels you can enclose this space quickly; another big panel makes a simple door that will not warp.

**Cedar closets.** The volatile oils present in cedarwood are a deterrent to moths, and a cedar-lined closet will protect woolens throughout the year without troublesome spraying or other treatment.

Cedar plywood comes in widths of 3 and 4 feet and lengths of 6, 7, and 8 feet. Order panels closest to the size of your closet walls to avoid waste and minimize cutting. If your closet walls are more than 4 feet wide, use ½-by-1½-inch batten strips to cover the joints between panels. Cedar plywood is installed as described on page 24.

Solid cedar is purchased in bundles varying from 10 to 40 square feet, containing random lengths of 1 to 8 feet. Inspect your purchase to see that the lumber is first-grade selected stock, without large knots which would result in waste. Installation is greatly simplified and speeded by the fact that cedar lumber comes tongue-and-groove not only at the sides but at the ends as well. Thus, you'll have no trouble joining the 3-inch-wide lengths for a tight seal. All you do is tap the sections together so the joints fit, and nail them in place.

The first step in installation is to nail up horizontal furring strips, ½ by 1 inch, set at 12-inch intervals. Nail these into

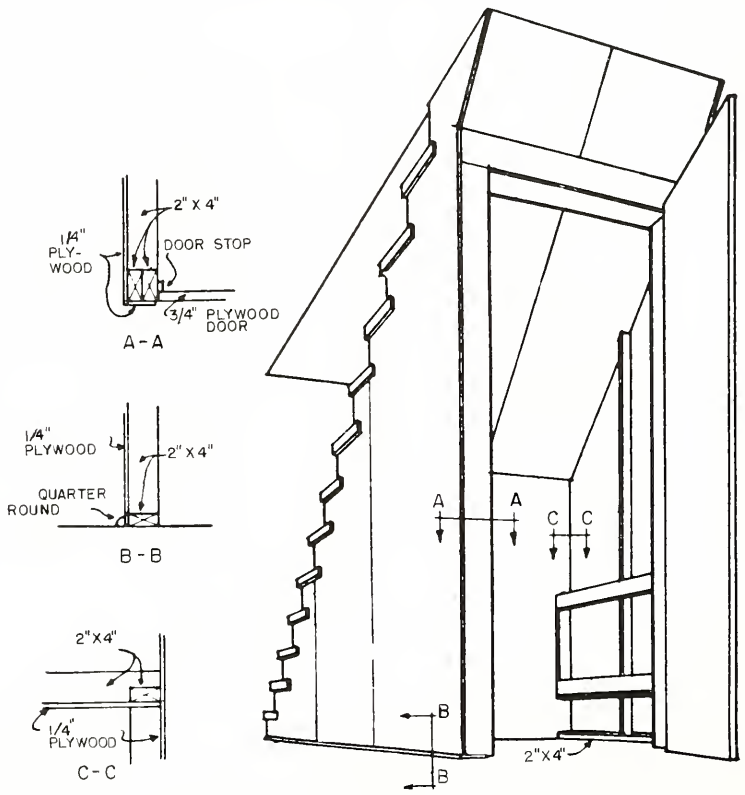



Figure 11–13 Understair basement closet.

the studs behind the wall surfaces. If the wall is finished with plaster backed by wood lath furring strips will not be necessary. In either case, be sure that nails driven into the walls are not so long that they come out on the other side.

If necessary, you can rip one of the boards to width easily, even with a handsaw, as the cedar is only ⅜ inch thick. In order to insert the last vertical row, rip the boards of this row about ¼ inch short. A simple butt joint will serve at corners, the grooved end of the board on the next side lying flat against the face of the last board on the previous side. Or you can cut off the outer lip of the groove on the butt end of the new board and insert the remaining lip into the ¼-inch space.

**Special closets.** In each home there are special needs and special possibilities for storage closets. Listed below are some suggestions.

*Office closet.* For the business of keeping the home there should be an office headquarters somewhere in the house. In this one place important letters, bulletins, catalogues, and reference books may be kept so that they are always available and easy to find. When there is no separate den, a small closet off the living room or the dining room or in the bedroom may be fitted up inexpensively to meet this need. Trays or drawers may serve as files for receipts and records, or to hold stationery and other supplies. Shelves may be partitioned for papers, and pigeonholes may be provided for correspondence. A shelf at the bottom of the closet is a good place to keep a strongbox for valuable papers.

The closet shown in Figure 11–14 is 18 inches wide and has space for practically everything in connection with home correspondence and home record-keeping.

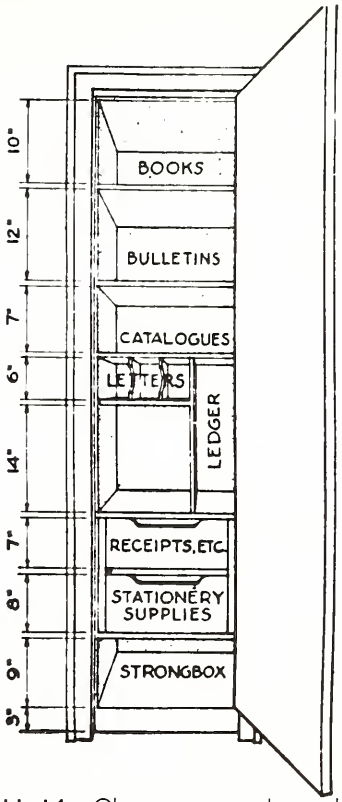



Figure 11–14 Closet arranged as a household office.

The upper drawer is sectioned to take care of receipts, unanswered letters, canceled checks, bills, and similar papers. The drawer is 15 inches deep and 16 inches wide. The compartments are 2½ inches from center to center of the partitions fitted into the drawer.

*Hideaway chest.* You can build a drawer chest or a shelf cabinet into any wall having enough unused space behind it, such as space under the eaves in a second floor or attic. The job is easiest to do when a wall is being erected, but can be done in an existing wall.

To make a hideaway drawer chest, start with a set of used or unfinished drawers, and measure it to determine the exact size of the wall opening. Figure 11–15 shows how to install the rough 2-by-4-inch fram-

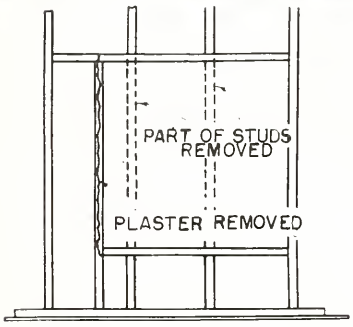
ing which holds the chest. Use hardboard to line top, sides, and back of chest. Note how lower front part of the sides is cut back so chest will come flush with wall. Then top and rear panels are nailed on. Before applying trim, patch space around opening with plaster or gypsum wallboard so it comes flush with wall. Drawers should have a 1/16-inch clearance all around. Space under lowest drawer is suitable for seldom-used articles, accessible only when drawer is pulled out.

*Storage space under stairways.* There is opportunity sometimes to use space under stairs leading to the second floor by paneling the wall and inserting cabinets (see Figure 11–16). The panels may be hinged doors with sliding compartments behind them, or the front of the compartment may be the face of the panelwork. Much of the usual household "junk" can be deposited in storage of this type.

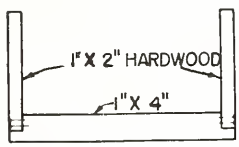
**Sliding doors.** Sliding doors generally are the answer to the problem of making every square inch of floor space in the closet



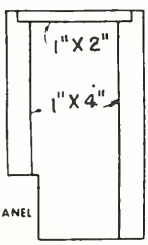
Figure 11–15 Hideaway chest, built in a wall. *Photograph courtesy of Hedrich-Blessing.*



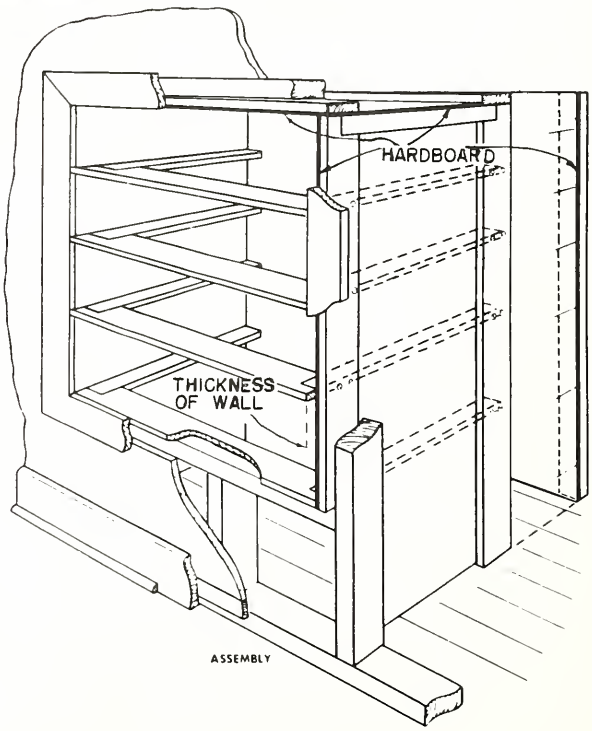

ROUGH FRAMING



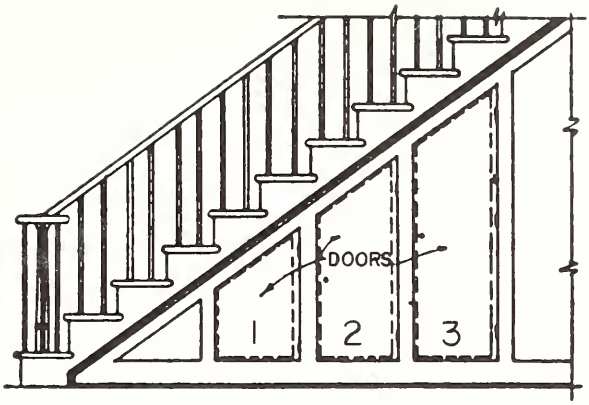

DRAWER GUIDE




SIDE PANEL




ASSEMBLY



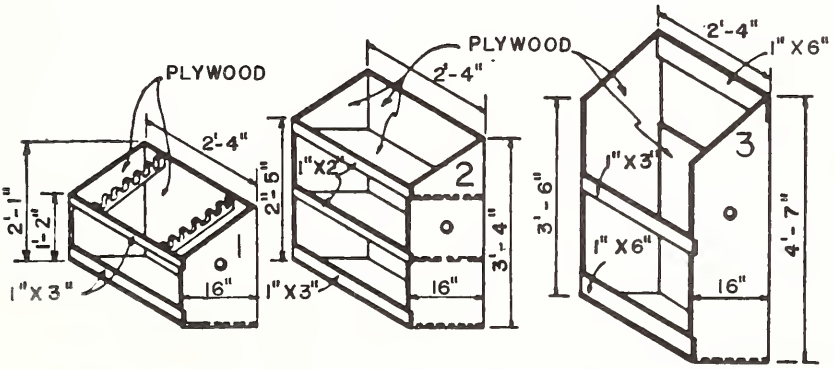






Figure 11–16 Understair storage unit. *Courtesy of Armstrong Cork Company.*

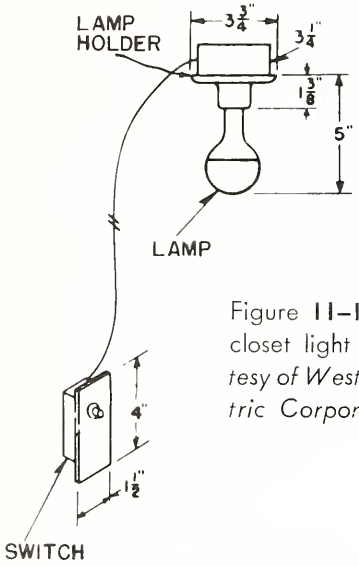



Figure 11–17 Automatic closet light switch. *Courtesy of Westinghouse Electric Corporation.*



usable. They are made of various materials and generally come in a packaged unit which includes the doors, all necessary screws, bolts, and other parts, as well as simple instructions.

Generally the doors are installed as follows: First check the doorframe to be sure it is plumb. Then attach the guide channel to the top member. The floor guides are then attached, secured by screws through holes punched in the guide. (No drilling is necessary.) Next, the door guides are attached to the top of each door. There are 2 to each door panel, and they are secured with screws. The door rollers, 2 on each door, are also put on with screws. These rollers fit in a slot on the bottom of the panel. The doors are easily set into place by inserting the top in the guide channel, then placing the rollers on the floor guides. After the door panels are in place, final adjustment is made on the guides so that they move smoothly and easily. The door can be painted or stained.

**Closet lighting.** The problem of lighting closets may be solved in several ways. If you are installing a new electrical outlet in a closet, place the outlet in a location just beside or just above the door. A light source in this position will illuminate the contents of a closet much better than a ceiling fixture. The reason, of course, is obvious; the closet shelf cuts off the light from a ceiling fixture and casts a shadow over all the garments hung below it. A fixture just over the door or beside the door jamb at 6 feet above the floor casts its rays both above and below the shelf. An added luxury is a door switch, installed to work automatically as the door is opened and closed (see Figure 11–17). The switch may easily be set into the door jamb just under the top hinge.

If there are no electric outlets in your closets and you wish to save the added cost of wiring, hang a small bracket light just inside the door and stretch an electrical cord to the nearest convenient outlet in the room. Bracket lights can be installed by simply hanging them on a small metal pin placed on the wall.

# STORAGE OUTSIDE THE HOUSE

**Outdoor closet or shed.** For articles such as children's play equipment and tools for the yard and garden, the best storage space is a closet out of doors. This should be in a dry place that can be reached conveniently from outside the house, such as a corner of the work porch, a woodshed, or the garage. From the standpoint of convenience and economy of space the walk-in type of closet is preferable. Walls should be of material that permits hooks and shelves to be placed as needed. Concrete or gravel is satisfactory for the floor.

In planning the space needed for tools the following dimensions may be helpful: Lawn mowers are about 12 by 24 inches, with handles about 54 inches long; larger garden tools such as rakes, hoes, and shovels are from 36 to 54 inches long.

Figure 11–18 illustrates a storage shed built onto the house, extending to the eaves to avoid detracting from the appearance of the house. There are separate compartments for tools and equipment and for children's toys.

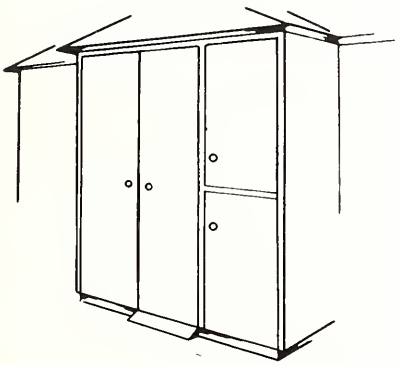


Figure **11–18** Outdoor storage shed, built onto the house. *Reprinted from* Popular Home—*United States Gypsum Corporation.*

**Garage extension.** Figure 11–19 shows a 2-closet addition to the garage. Half of this garage extension, used for work-

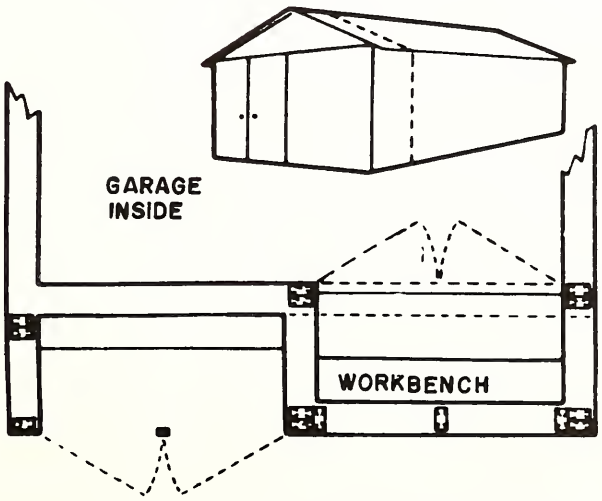
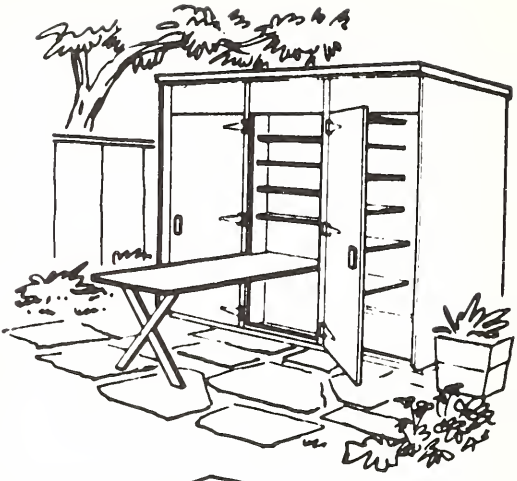
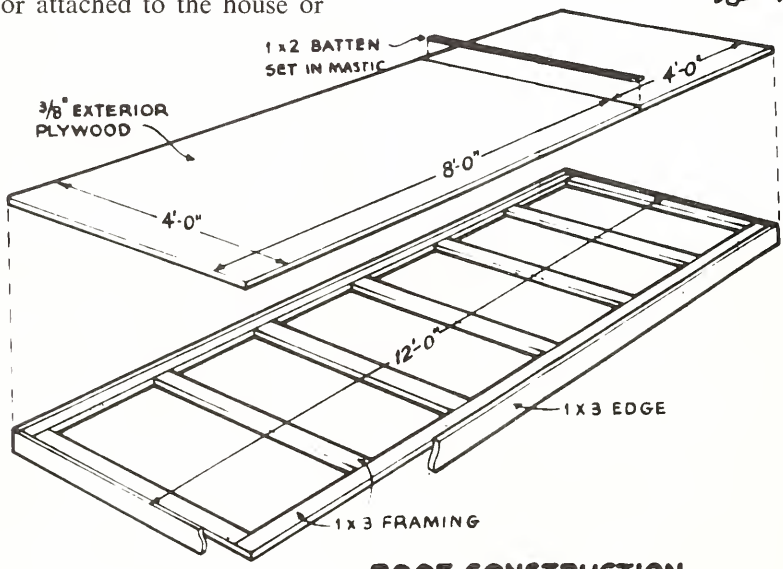



Figure **11–19** Garage extension, providing a closet accessible from the outside and another from the inside of the garage.

bench and shelves, is accessible from inside; the other half stores tools and equipment used for outside work and opens outward.

**Outdoor storage wall.** Figure 11–20 shows an attractive "outdoor built-in" that is as useful as it is good-looking. It gives plenty of space for storing garden tools, fertilizer, children's toys, and barbecue equipment, and has shelf space for pots and plants. The handy table-door can be folded down for summer dining or a garden work center. The unit can be built free-standing or attached to the house or garage.






**ROOF CONSTRUCTION**

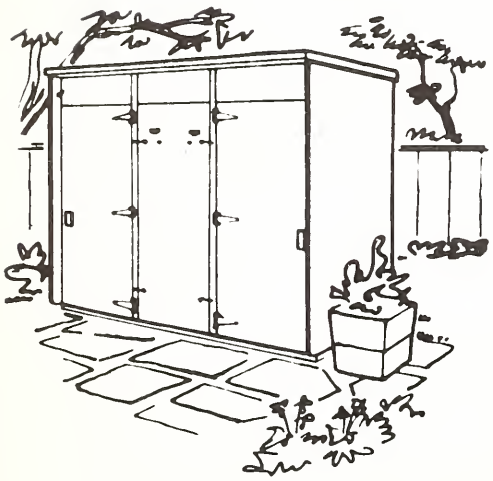
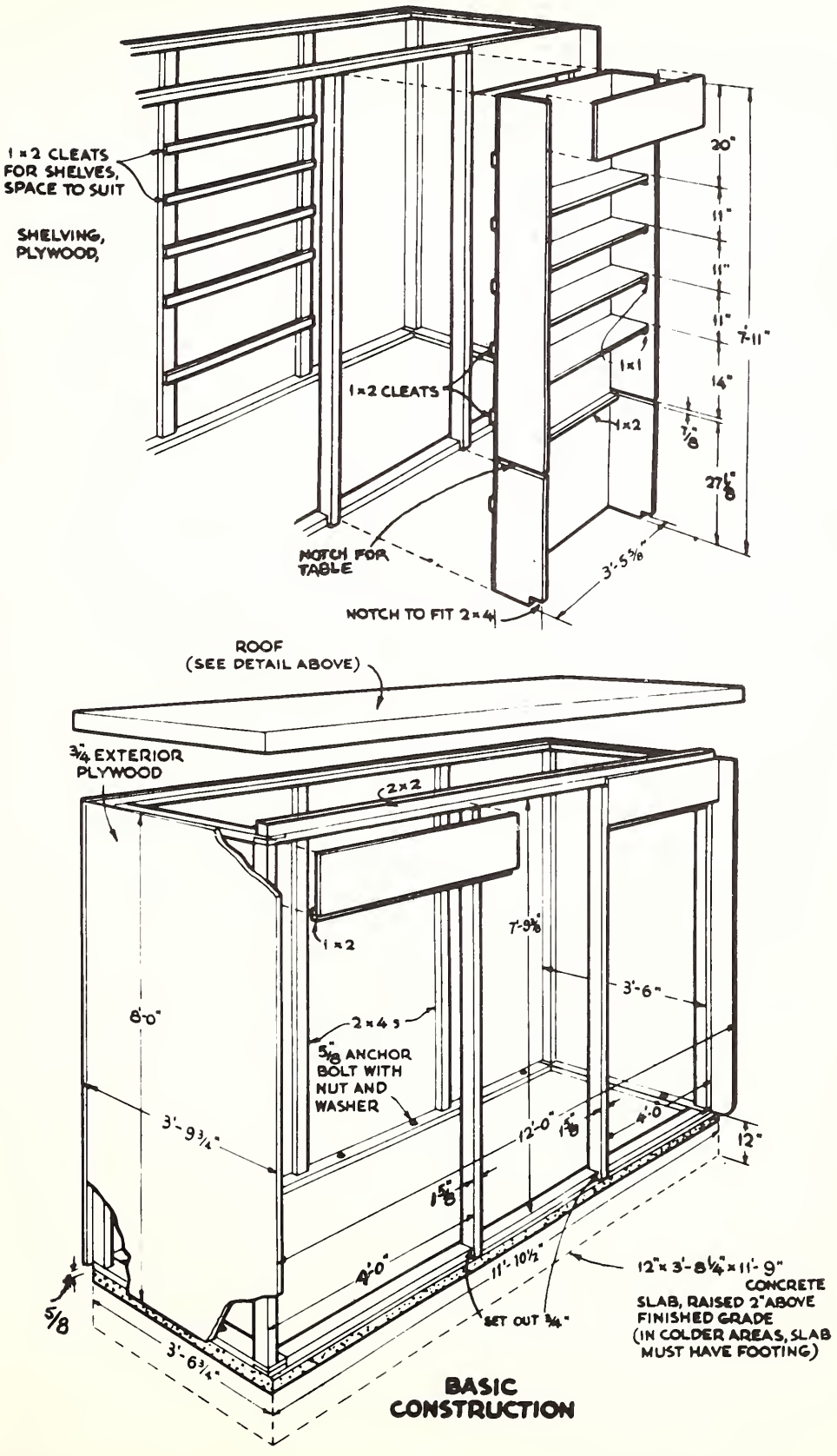


Figure 11–20 Outdoor storage wall. *Courtesy of Douglas Fir Plywood Association.*




**BASIC CONSTRUCTION**

**Storage port.** Figure 11–21 shows a roomy storage port that can hold anything from the family car to a trowel. Big, deep closets provide space to store bulky gear like screens, bicycles, and refuse cans. Smaller cabinets are for tools and cleaning equipment. The garden closet is big enough to hold wheelbarrow and fertilizer. You can incorporate the storage units into a carport or build them as a free-standing unit.

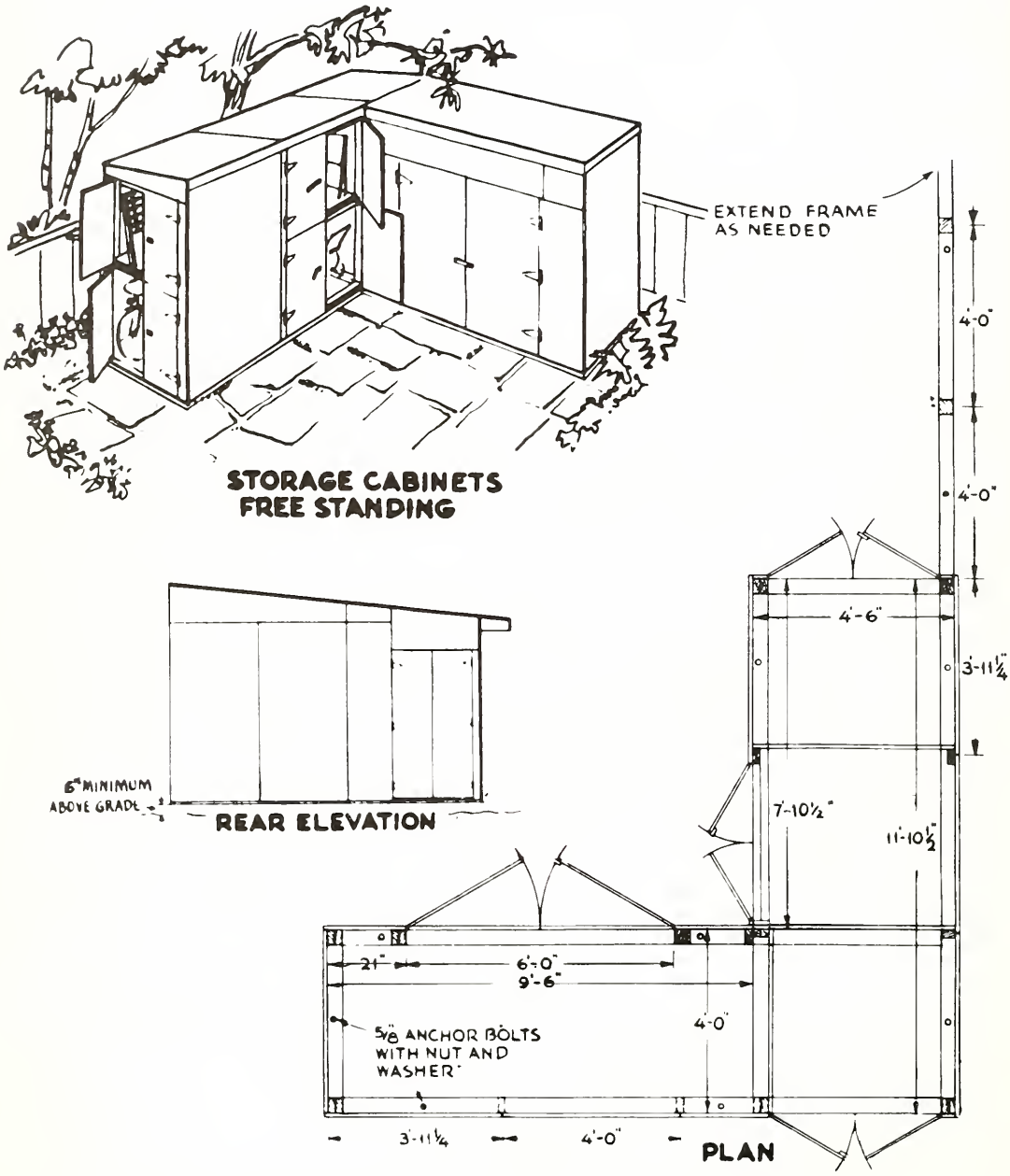
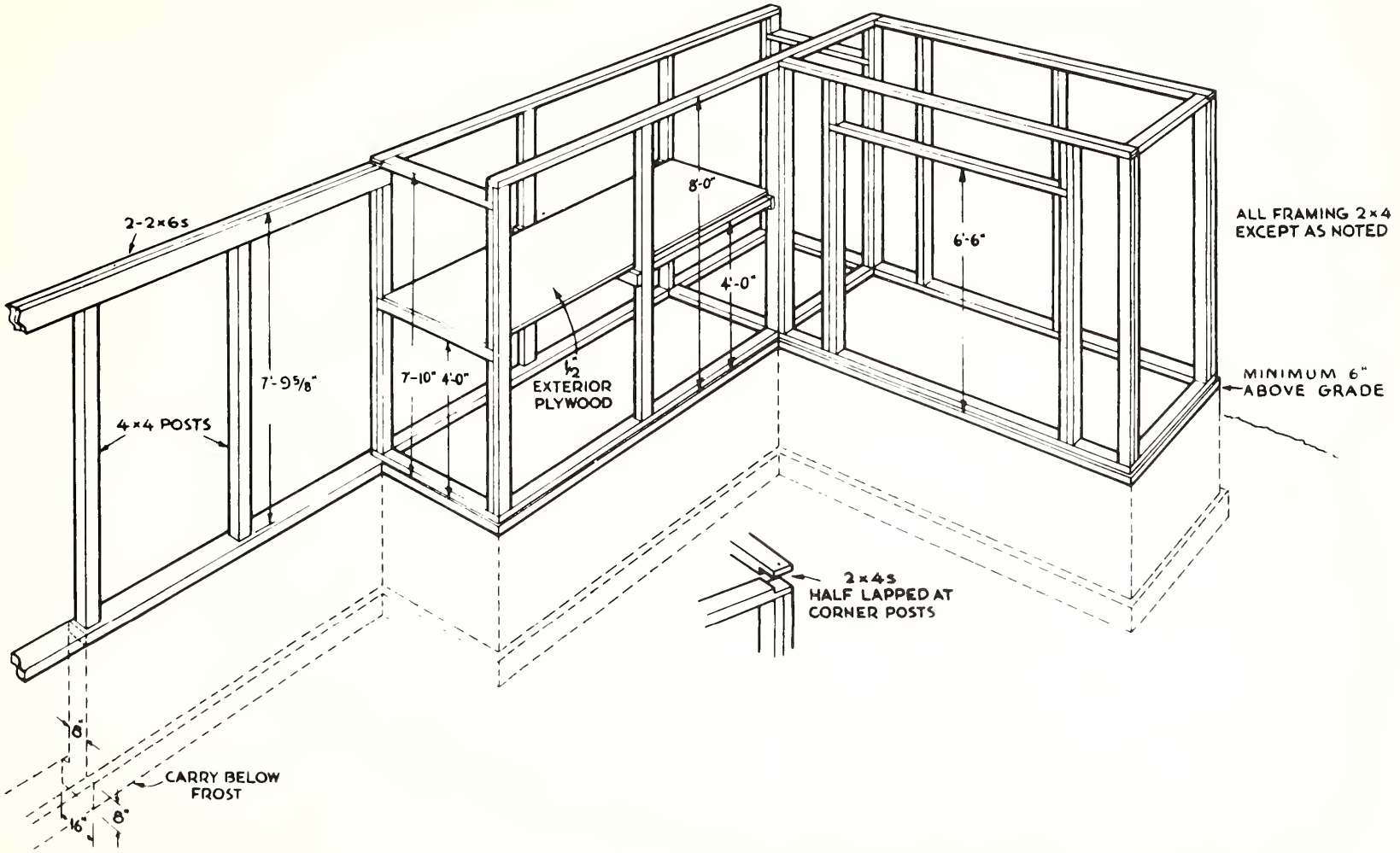



Figure 11–21 Storage port. *Courtesy of Douglas Fir Plywood Association.*


2-2×6s
4×4 POSTS
7'-9⅝"
7'-10"
4'-0"
8'-0"
4'-0"
½" EXTERIOR PLYWOOD
6'-6"
ALL FRAMING 2×4 EXCEPT AS NOTED
MINIMUM 6" ABOVE GRADE
2×4s HALF LAPPED AT CORNER POSTS
8"
CARRY BELOW FROST
16"
8"

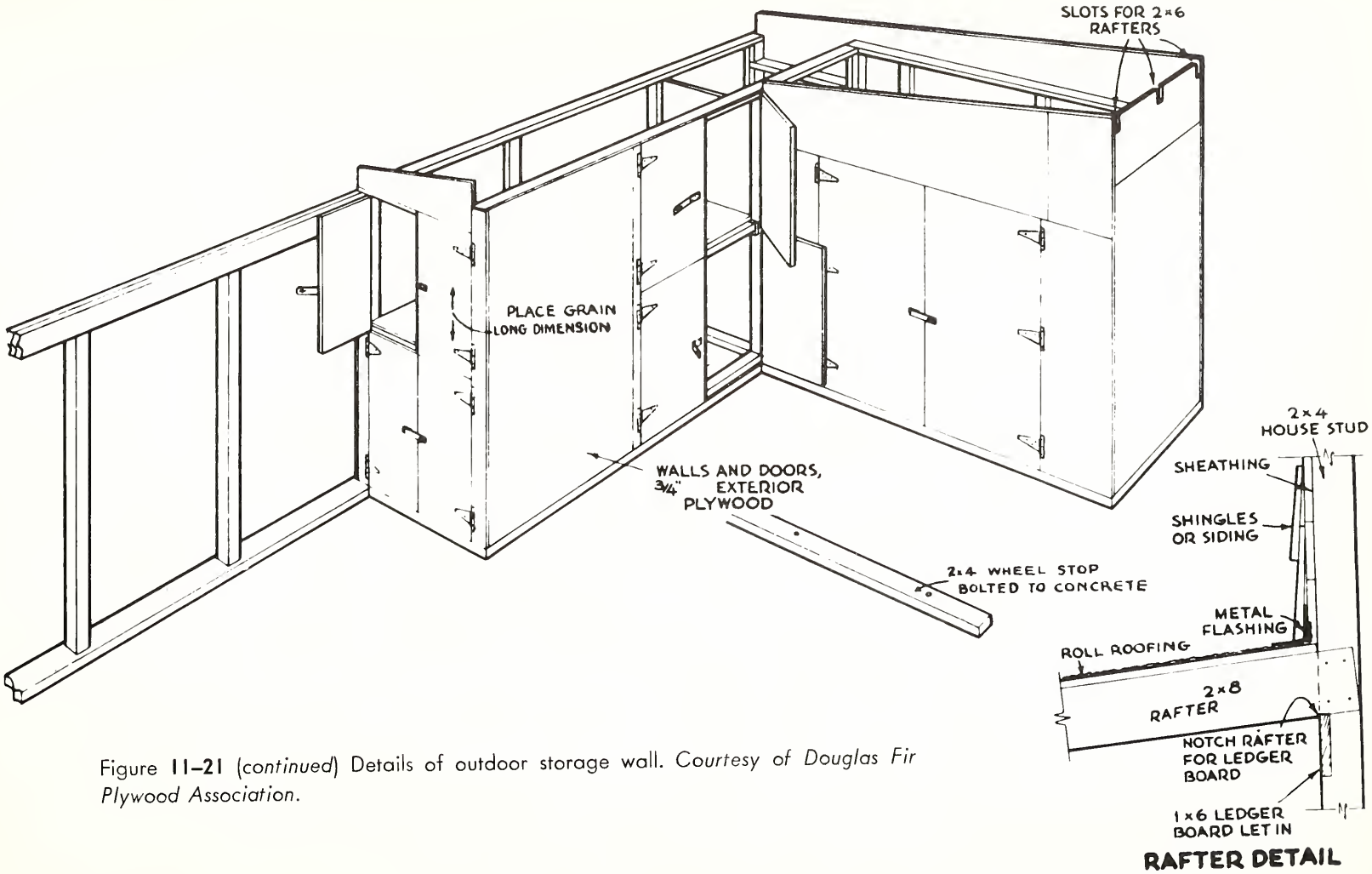
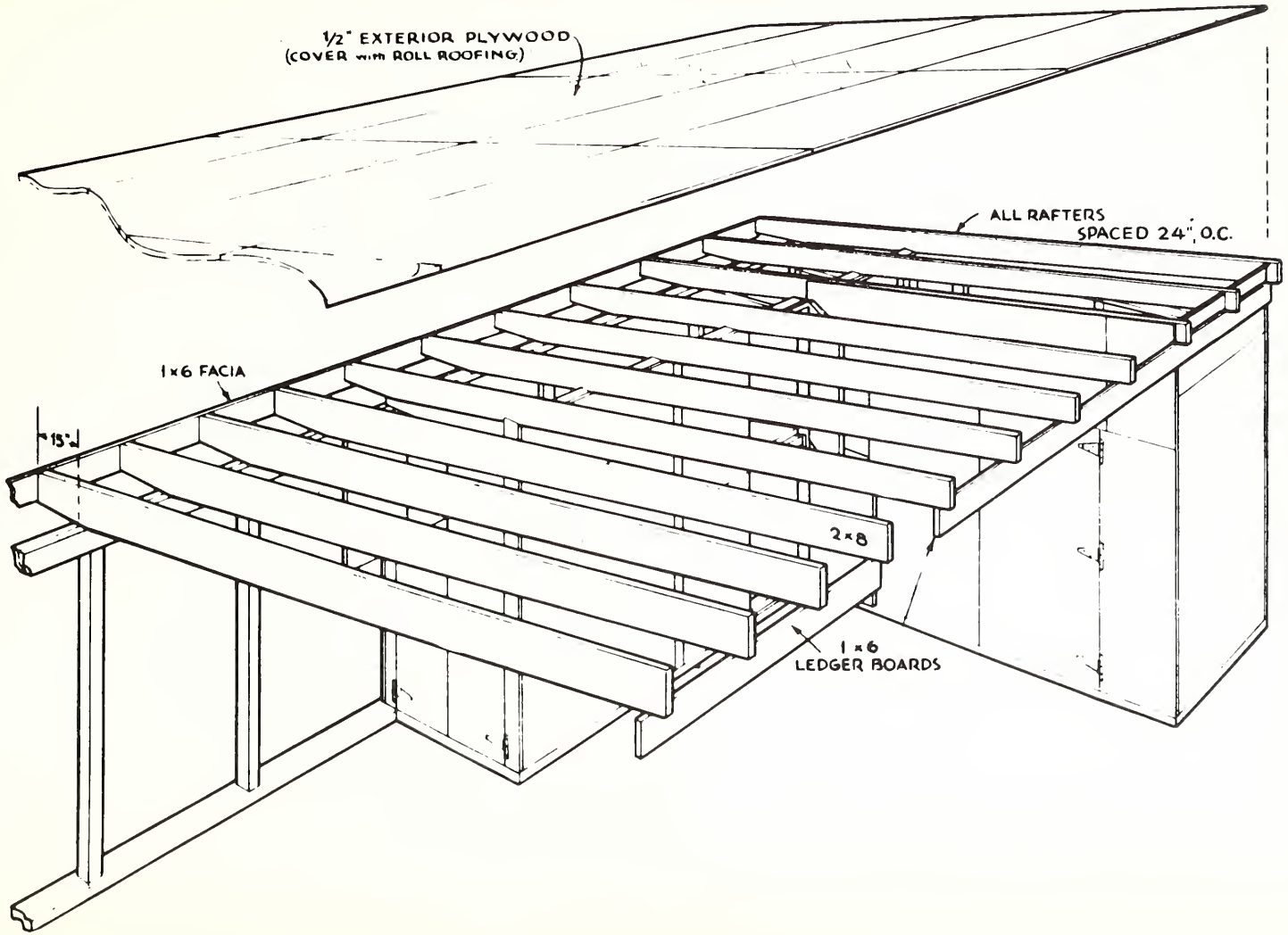



Figure **11–21** (*continued*) Details of outdoor storage wall. *Courtesy of Douglas Fir Plywood Association.*

MINIMUM
ROOF PITCH 1:12



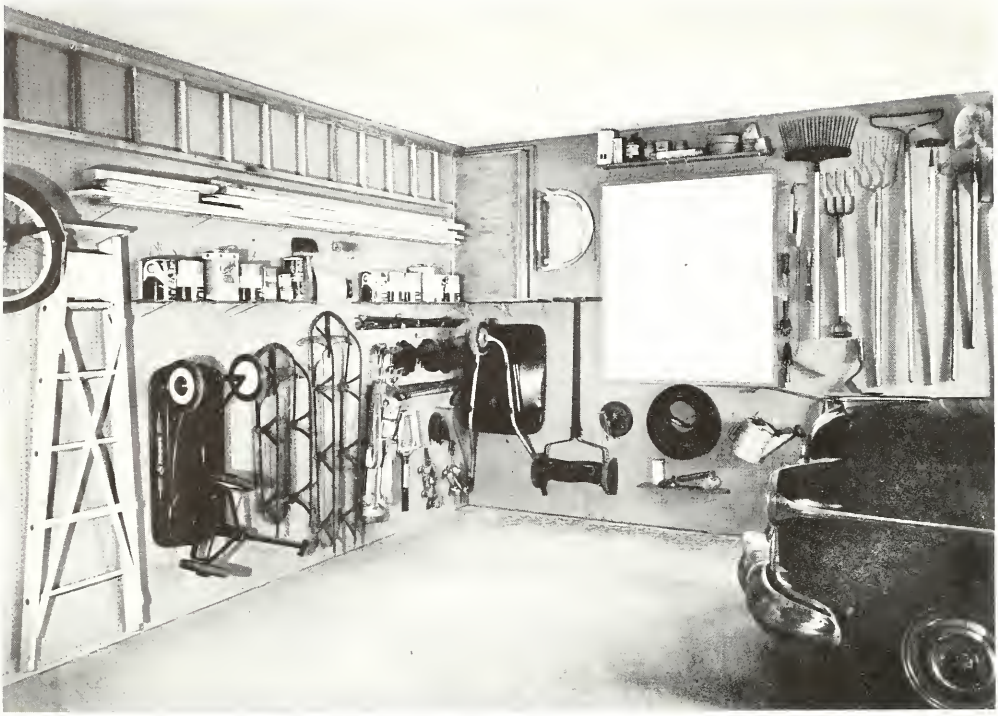


Figure 11–22 Garden-tool storage space featuring the use of perforated hardboard. Note how the hooks hold heavy objects in place. They are also easily adjusted for any use. *Courtesy of Masonite Corporation.*

**Utilizing garage space.** Inside the garage itself, there is plenty of room for storage. Racks and shelves made of pine boards, hung from above or braced from below, can be installed in the unused space above the door opening. Or you can build a storage balcony in the space over the hood of your car.

If out-of-season clothing is immobilizing your bedroom closets, let a cabinet in the garage do the job. Any of the cabinets described in Chapters 5 and 6 will do. Seal the door with masking tape, and you need not worry about moisture or moths.

Figure 11–22 suggests ways of hanging garden tools on the garage wall.

# CHAPTER 12

## WOOD FINISHING

AFTER the project has been made, the final step is finishing. The importance of proper finishing is obvious; without it the project will fall short of what it should be.

Wood can be finished in a number of ways. It can be varnished, shellacked, lacquered, painted, or waxed. A paint suitable for furniture, such as an enamel, may be used when the wood is unattractive or when color fits into your decorative scheme. If the wood grain has an attractive appearance, a natural finish may be used, or the wood can be bleached out and given one of many attractive modern finishes.

First, however, the surface must be prepared for finishing. All marks left on the wood after construction must be removed. The rough edges left by the saw should be sanded until perfectly smooth. If they are very rough, first touch them up with a plane or rasp, and then sand. Small dents may often be removed by placing several thicknesses of moistened cloth over the dent and then pressing with a hot iron. The steam swells the wood fibers and brings them back to their original position. The process may have to be repeated several times to remove the dent completely. Sandpaper the surface when it is dry. Holes and imperfections may be repaired by using a crack filler according to manufacturer's directions; by using fine sawdust mixed with glue (use only when the finish is of lacquer); by inserting plugs or small pieces of wood cut so that the grain will match; or by using ordinary stick shellac.

Nailheads should be punched below the wood surface and the resulting hole filled with wood filler. Screwheads that have been countersunk can be treated in the same manner. However, a more professional method is to glue a wood plug on top of the screw head. The wood plug is cut off flush with the wood surface after it is in place (see page 10).

Check all the joints on the piece to be sure they are solid. If they do not appear to be strong enough, additional nails or screws may be necessary. In some cases, metal angle irons or wood blocks may be required.

**Sanding.** The next step is preparing the wood for a finish is to give all surfaces a thorough sanding. At least 2 grades of paper should be used on each piece. As a general rule, coarse garnet or aluminum oxide will remove all tool marks, while fine grits will give a smooth surface for the finish. The tendency is to use too coarse a paper for final sanding. On a fine piece of furniture, nothing coarser than the fine grade should be used for final sanding.

Until recently, choosing the correct grit required a thorough understanding of a complicated numbering system whereby the grain sizes were referred to as 2–36, or 6/0–220, etc. In either case the larger the number, the smaller the size of the mineral particles and the finer the grit. To simplify this situation for the home craftsman, most manufacturers have begun labeling their papers as very fine, fine,

medium, etc. The grit classification to be used depends entirely upon the wood you are using and the step in construction for which you intend using your sandpaper. The table below lists the old numbering system and the new equivalents.

All sanding should be done in the direction of the wood grain. If the sanding is done by hand, make or buy a sanding block with a felt or rubber pad attached to the underside. This does a better, faster job than if the sandpaper is pushed by hand alone.

A good deal of time can be saved on larger projects by using a power sander. Belt or oscillating sanders are excellent for this purpose.

*Abrasive recommendations.* The following grades of paper are recommended for various surfaces.

HARDWOODS. Coarse garnet or aluminum oxide for first sanding, followed by fine to very fine, depending on quality of work.

SOFTWOODS. Coarse garnet or aluminum oxide for first sanding, followed by fine.

VENEERS. Same as solid wood when grain can be followed; otherwise very fine or extra fine waterproof grit for finish sanding.

AFTER WATER-SPONGING. Fine or very fine garnet or aluminum oxide, used after surface is dry.

SANDPAPER TABLE

| New classification—all types of paper | Aluminum oxide or silicon oxide | Old numbering system—types of papers | | |
|---|---|---|---|---|
| | | Garnet | Flint | Emery |
| Super fine | 10/0–400 | 10/0–400 | | |
| Extra fine | 9/0–320 | 9/0–320 | | |
| | 8/0–280 | 8/0–280 | | |
| | 7/0–240 | 7/0–240 | | |
| Very fine | 6/0–220 | 6/0–220 | 4/0 | |
| | 5/0–180 | 5/0–180 | 3/0 | 3/0 |
| | | | 2/0 | |
| | 4/0–150 | 4/0–150 | | 2/0 |
| Fine | 3/0–120 | 3/0–120 | | |
| | | | 0 | 0 |
| | 2/0–100 | 2/0–100 | | |
| | | | 1/2 | 1/2 |
| Medium | 0–80 | 0–80 | | 1 |
| | | | 1 | 1 1/2 |
| | 1/2–60 | 1/2–60 | | |
| | | | 1 1/2 | 2 |
| Coarse | 1–50 | 1–50 | | |
| | | | 2 | 2 1/2 |
| | 1 1/2–40 | 1 1/2–40 | | |
| | | | 2 1/2 | |
| Very coarse | 2–36 | 2–36 | | |
| | | | | 3 |
| | 2 1/2–30 | 2 1/2–30 | 3 | |
| | 3–24 | 3–24 | | |

**Brushes and brushing.** Brushing is the commonest method used in the application of finishing materials. It is a slow method compared with the spray gun, but has advantages in simplicity of equipment and ease of application. With paint, varnish, and other brushing mediums, the quality of the brushed finish, as judged by durability and appearance, is equal and in some cases superior to the same finish applied by spraying with a gun.

The best all-purpose finishing brush is an XXX black China hog bristle, full chisel, about 2½ inches wide. Softer brushes, such as those made from goat, sable, badger, or nylon, can be used to advantage for flowing, quick-drying materials. The most popular of the soft brushes is the fitch hair brush—excellent for flowing varnish. "XXX" on a brush means that the bristles are put up in 3 rows or thicknesses. This is the most popular style. Single-thickness and double-thickness brushes are proportionately thinner in body and are useful where flexibility is required, as for brushing around a turning. Good brushes have flag ends. In cheap brushes, the bristles are commonly cut to length and do not have the paint-holding flags at the ends of the bristles. Most finishers prefer a full chisel brush, that is, one in which long and short bristles are arranged to form a true chisel edge. A cheap chisel edge is sometimes made by trimming the bristles. All brushes are made in varying bristle lengths. Painters working on large areas prefer a long bristle because it holds more paint. Better control is possible with the average or medium-length bristle.

The proper handling of a brush is largely a matter of common sense, coupled with a little practice. Use the tip or edge of the brush to work into corners or to make a line or edge. Cross-brush all large areas for good coverage and to eliminate any skipped places, or "holidays." Brush turnings round-and-round and then use light lengthwise strokes where possible. For general brush work, the bristles should be dipped to a little over ⅓ of their length. Surplus paint or varnish should be wiped off on a strike wire or on the edge of the can. Finishing materials are either brushed out or flowed on. Materials such as varnish and shellac work best if flowed on and allowed to level off. In finishing flat surfaces, brush out toward the edges; this will prevent drips which invariably occur when a loaded brush is pulled over a sharp edge. When brushing stain, shellac, lacquer, and other materials where a uniform coat must be applied, exercise care to prevent double-coating any areas: Start the loaded brush on bare wood and brush into the lap left by the previous brushful. This is good technique in applying any finishing material.

Immediately after use, the brush should be cleaned with the proper solvent. Work the solvent well into the heel of the brush. Slap the brush over the edge of the hand to throw out the solvent and dirt; do not bang the brush over the edge of a board. Keep the bristles straight by combing with a wire or fiber brush. Stain and shellac brushes should be wrapped in paper after cleaning; others can be kept in a brush keeper.

**Spraying.** In recent years, portable spraying equipment has been manufactured in the moderate price range for the average home craftsman. Since there are various types, it is necessary to check the manufacturer's instructions for proper technique and use of the gun.

**Enameling.** Before enameling, sand the wood very smooth and be sure it is clean and dry. First, apply an enamel undercoater. (In the case of fir plywood, use

the sealer first and, when dry, apply undercoater.) This undercoater can be either an ordinary flat white paint or a special enamel undercoater. If the finish is to be a color other than white, the undercoater can be tinted either by mixing some colors in oil into it or by adding a little of the enamel you plan to use as the finish coat. Allow the undercoater to dry at least 24 hours and then give the surface a sanding with fine garnet or aluminum oxide paper. Remove all traces of dust with a clean cloth dampened in turpentine.

Since there are many new enamel-type paints on the market today, always check the manufacturer's directions on the container. In general, 1 coat of enamel will be sufficient. If it is not, allow it to dry thoroughly, give a light sanding with very fine sandpaper, followed by a dusting; then apply a second coat.

**Stains and staining.** Staining is usually the first operation in applying a transparent or semitransparent finish to new wood if the natural color of wood is not desired. The craftsman is allowed considerable latitude in the selection of a stain, since there are hundred of types and colors. Though many different kinds are available, water stains, oil stains, spirit stains, and acid stains are the most common. The latter two are seldom used by home craftsmen.

*Water stains.* Water stains may be purchased in powder form in a variety of colors, and mixed as needed by dissolving the powder in hot water. Water stains can be sprayed or brushed. Since the water in the stain raises the grain of the wood, a previous sponging with warm water is advisable. Some workers prefer a small amount of dextrin in the sponging water to stiffen the wood fibers—2 ounces per gallon. Dextrin, also known as starch gum, can be easily obtained at any wallpaper store.

When the wood is dry, sand it with fine paper. Then apply the stain freely and rapidly. Better penetration is obtained if the stain is used warm. Brush on the stain in long smooth strokes, with the grain. Wiping the end grain with a cloth will prevent darkening. Other methods used to prevent darkening of end grain include: (1) previous treatment with a thin glue size; (2) sponging with water immediately before staining; and (3) using a separate light stain.

Water stain will dry overnight or in 12 hours. A wash coat of 7 parts alcohol to 1 part shellac can be applied when the stain is dry. A light sanding will then remove any remaining traces of raised grain.

Manufacturers have developed stains in which water-soluble powders are dissolved in a solvent other than water. Stains of this kind are known by various descriptive trade terms, such as non-grain-raising stain, fast-to-light stain, non-sand stain, etc. They are more expensive than regular water stains because of the solvent used, but offer one of the best stains for new work. Their rapid drying makes brushing difficult, but smooth coats are easily applied by spraying. They are non-bleeding, and can be used under any type of finish coat. They dry in 10 minutes to 3 hours, depending on the type. Ready-mixed colors are numerous. Primary colors are available for mixing tints to suit individual tastes.

*Oil stains.* The most commonly used oil stains are those made from colors or pigments ground in linseed oil. Oil is non-grain-raising, and oil stains do not require previous sponging. They can be brushed or sprayed. The main difference in technique between water and oil staining is that oil stain is wiped with a rag to remove the surplus and equalize the color. Wiping is done while the stain is wet, but time should be allowed to ensure good

penetration. Immediate wiping of the end grain will eliminate darkening. Since oil stains will bleed into finishing coats of varnish and lacquer, always seal the stain with a wash coat of shellac. Avoid the use of oil stains on birch, maple, gum, cherry, or mahogany.

**Fillers and seals.** A filler is used to fill the pores in coarse-grain woods before applying the final finish. A sealer is any liquid finishing material used as a first coat on close-grain wood or over the filler on coarse-grain woods.

FILLER FOR VARIOUS WOODS

| No filler needed | Liquid or thin paste | Paste filler |
|---|---|---|
| Cedar | Birch | Ash |
| Cypress | Cherry | Chestnut |
| Fir | Gum | Elm |
| Hemlock | Maple | Hickory |
| Pine | Redwood | Kornia |
| Poplar | | Mahogany |
| Spruce | | Oak |
| | | Walnut |

Prepared paste filler, which is inexpensive, is generally the best for home craftsmen. Although it may be purchased in a number of colors, select a shade slightly darker than the color of your wood; for the wood will gradually turn darker as it ages. If the desired color cannot be obtained, get a light color and add colored pigment in oil.

Liquid filler is generally a cheap varnish with a small amount of silex added. It is used on cheap work in medium close-grain woods. For a better grade of work a thin paste filler is more satisfactory. The table lists the various common woods and the type of filler, if any, required for each.

Before using paste filler, thin it by mixing it with a small amount of turpentine or naphtha, until it is of proper consistency to brush. Wood with coarse pores will require a thicker filler than wood with small pores. About 3 pounds of filler to 1 quart of solvent is correct for mahogany, while walnut can take a slightly thinner filler (about 2½ pounds per quart of solvent).

To apply the filler, use a fairly stiff brush. Brushing is done with the grain, in order to pack the filler into the pores of the wood. In 5 to 20 minutes, the filler will start to lose its wet appearance. As soon as spots begin to flat out, take a piece of burlap or a handful of hair and pad the filler into the pores. Clean off the surplus filler by wiping across the grain; and finish wiping with clean rags, stroking with the grain. If the filler sets up too hard for easy wiping, moisten the wiping rag with benzine.

Inspect the entire project thoroughly. If the pores are not filled level, apply a second coat of slightly thinner filler immediately, wiping off in the same way. Paste filler should dry for 12 to 24 hours, unless it is a fast-drying type, which is ready in 3 to 4 hours. In any case, it is of the greatest importance that the filler be bone-dry before any other coating is applied. The dry filler should be sanded lightly with fine or very fine garnet or aluminum oxide paper, and wiped off with a rag moistened with benzine.

Whether or not to seal the filler is largely a matter of preference. The same applies to sealing the stain coat before applying the filler, except in the case of softwoods, such as fir, which must be sealed before staining. Generally, however, it is good practice to seal both stain and filler on first-class work. A special resin sealer is best for the job, but for many people shellac is the old stand-by—white shellac for light finishes and orange shellac for browns and mahoganies. The shellac is first reduced with alcohol (4 to

1 for filler sealer; 7 to 1 for stain sealer), after which the shellac is poured slowly into an equal amount or less of mixing lacquer. This mixture brushes more easily than straight shellac, is almost waterproof, and dries to recoat in about two hours. Any type of sealer coat over the filler should be sanded with fine paper when dry, after which the work is ready for finishing coats of varnish or lacquer.

**Varnish finishes.** Varnish makes an excellent transparent finish on wood, being unequaled for depth or build and possessing good durability and hardness. It brushes easily to a perfectly smooth film and dries to recoat in from 24 to 48 hours. Each of the many kinds of varnish manufactured is made for some specific purpose.

Varnishing should be done in a dust-free room, between 70 and 90 degrees Fahrenheit. Some craftsmen sprinkle the floor with water to settle any dust that may be there. Before the varnish is applied, dampen a piece of lintless cloth in a little varnish and wipe the surface with it. The small amount of varnish in the cloth will pick up dust which would not otherwise be caught. Spread the varnish on as it comes from the can—evenly with long strokes, first with the grain, then across grain, and then with the grain. As varnish is slow-drying, thinned shellac is often used for the sealer coat. The shellac dries quickly and does not soak into the wood, thus speeding up the drying of the varnish.

A good varnished surface usually requires 3 or 4 coats. Rub each coat down with fine steel wool or extra fine sandpaper, after letting the varnish dry for at least 48 hours. Remove all dust from the surface, after sanding, by rubbing with a lint-free cloth moistened with turpentine, or use a chamois dampened with water. Pumice and oil, followed with rottenstone and oil, will produce a finely polished surface.

**Shellac finishes.** Shellac makes a good finish for many pieces of furniture. It is hard, quite easy to apply, dries in a few hours, and does not require a dustproofer.

Since shellac dries very quickly, one must work fast with it or it will become tacky and hard to handle. Never apply shellac over a damp surface, for the moisture will cause the shellac to cloud. Brush with the grain of the wood and do not brush too much. For best results, dilute the shellac with alcohol. It is easier to apply thinned shellac, and (unless you are experienced in applying it unthinned) you will generally get a better-finished surface. Several coats of thin shellac are best for a well-finished surface.

Standard shellac ordinarily dries hard in about 8 hours, although thinned shellac dries in 3 or 4 hours, ready for sanding. Go over it with fine sandpaper or 2/0 fine steel wool after each coat of shellac has dried. Sandpaper with the grain of the wood. After each sanding, brush the surface and rub with a cloth dampened with benzine to remove the dust before applying another coat. The final rubbing or polishing should be done with FF pumice stone and rubbing oil, using a felt pad.

**Lacquer finishes.** Roughly speaking, lacquer can be divided into 2 groups—brushing lacquer and spraying lacquer. Lacquers dry very rapidly. Generally, spraying lacquers dry so rapidly that they cannot be applied by brush. Therefore, when purchasing, be sure to specify the type you want, and follow the manufacturer's instructions to the letter.

The solvent used with lacquer for thinning or as a cleaner for brushes or gun

is lacquer thinner. Thinners suitable for paints and varnish should never be used with lacquer. While paints and varnish can be applied over lacquer, lacquer should never be applied over paint or varnish because the solvent in the lacquer will soften up these base coats.

**Rubbing with pumice and rottenstone.** A popular finishing coat for varnish, lacquer, and shellac is that obtained by rubbing the finished surface with pumice or rottenstone. Mix the pumice with either water or oil (either paraffin or mineral), and use a felt pad to rub the paste over the finished surface. Rub with the grain. Use pumice with oil on shellac finish, not with water. Rub until the desired finish is obtained. Rottenstone is much finer than pumice and is used in the same manner, usually following a rubbing with pumice.

If water is used with either pumice or rottenstone, it makes the mixture cut faster and produces a duller finish. When rubbing edges, corners, and high spots, be very careful not to rub hard enough to cut through the finish. Clean the surface thoroughly with a soft rag after rubbing.

**Wax finishes.** A wax finish has a pleasing eggshell gloss and is satisfactory for furniture as well as for floors and woodwork. Fill the wood and give a sealing coat of thinned shellac, lacquer, or varnish, and allow to dry. Sandpaper lightly before applying the wax.

Rub the wax on the surface, a little at a time, with a soft cloth. Allow to dry for about 20 minutes, and then rub hard with a soft cloth. Several coats are usually required.

**Bleaching or "blonding."** Bleaching is the name given to the process of lightening the color of wood by the use of chemicals. It plays an important part in so-called "blond" finishes. Apart from the bleaching process, the various blond finishes do not differ in any way from other finishes. Not all blond finishes are secured by bleaching. Maple, birch, and other light-colored woods are successfully blonded by the use of a pigmented undercoat. This subject is treated at the end of this section.

Simple homemade bleaches are 100 per cent effective on light-colored woods, and will lighten any dark wood to a considerable extent. Typical of these is the simple oxalic-acid bleach, which is inexpensive and easy to make. Three solutions are required: the first consists of 3 ounces of oxalic-acid crystals dissolved in 1 quart of water; the second consists of 3 ounces of sodium hyposulphite (photo hypo) in 1 quart of water; the third solution is made from 1 ounce of borax in 1 quart of water. These chemicals can be obtained from any drugstore at small cost.

All solutions are made with hot water but are used cold. The oxalic-acid solution is applied first, with a brush or rubber sponge. When this coat has partly dried, the second solution (hypo) is applied, after which the work should be allowed to dry thoroughly. If the color of the wood is not light enough, the process can be repeated. When the color is right, the surface should be flushed with the borax solution. Overnight drying should be allowed before sanding. The work is then ready for any kind of varnish or lacquer finish.

There are several ready-prepared commercial bleaches which are high-powered enough to give nearly white tones on walnut and mahogany in a single application. The procedure for applying these bleaches varies with the brand, and therefore the manufacturer's directions must be followed. In any case, complete dry-

ing must be allowed. After the work is completely dry, it should be sanded lightly with very fine sandpaper to remove any chemical residue and to clean up wood fibers lifted by the bleaching solution.

Wood is usually bleached a bit more than is required for the final finish. The color is brought back to the desired shade with a light application of non-grain-raising stain, applied in such a manner as to equalize any possible variations in color. The stain is followed by a wash coat of shellac or lacquer, after which the regular schedule of filler and top coats completes the finish.

**Blond sealers.** Excellent blond finishes can be obtained by using a surface color or blond sealer, without bleaching. This is a very satisfactory method of treating naturally light woods. Add white lacquer enamel to clear lacquer, or, if an amber effect is desired, add tan to clear lacquer for the desired shade. Blond sealers of this kind can be purchased ready-mixed. A uniform, light coat of the sealer will produce a satisfactory blond color without obscuring the natural grain of the wood. This blonding technique is perfect on maple and birch and can be used on walnut and mahogany to produce a pleasing tone, a little lighter than the natural color of the wood. When overdone on dark-colored woods, it gives the wood a painted appearance, and the effect is not pleasing.

## METHODS OF FINISHING VARIOUS SURFACES

**Finishing fir plywood.** Many of the projects outlined in this book call for the use of plywood. The most popular and most economical types are made of fir. Fir plywood needs a good sealer, because of the special character of the grain which is made up of alternate hard summer growth and softer spring growth. Without the use of a sealer, the first coat of paint or stain penetrates unevenly, resulting usually in a "wild," overly conspicuous grain. To "tame" or quiet this grain, several special types of sealers are available; they allow the stain to soften the darker markings and deepen the lighter surfaces.

To obtain a light natural finish, first sandpaper the wood smooth with medium sandpaper, and then apply an even coat of resin sealer. Lightly sand when dry, and follow with a thin coat of pure white shellac. It is suggested that the shellac be reduced to 2-pound cut. Sandpaper again when dry and apply either a satin-finish lacquer or a gloss varnish. If a flat finish is desired, a flat or dull varnish may be substituted. After it is thoroughly dry, steel-wool the surface and apply white wax.

A blond or pickled effect may be given to fir plywood by using a white plywood sealer or an interior white undercoater, thinned as follows: 6 pounds of flat undercoat, 3½ quarts of pure turpentine, and 1 pint of linseed oil. If the white sealer is used, it may be thinned 10 to 15 per cent with mineral spirits or turpentine. Paint the sealer on and allow it to set for 3 or 4 minutes. Then rub it into the pores and wipe clean, with care taken not to leave a painted effect. Let it dry overnight and next day lightly sand

with very fine sandpaper. Apply a thin coat of pure white shellac, and sand when dry. Follow with a coat of lacquer or varnish. Steel-wool when dry, and wax.

An inexpensive but attractive finish may be given with a single coat of white sealer or interior white undercoater, pigmented to the desired tint and thinned sufficiently so that the grain of the wood will show through. A second coat of clear shellac or varnish will add to the durability of this finish and give it a deep luster.

For a painted surface on fir plywood, sealer will provide a smooth, even base. For best results, the sealed surface should be sandpapered. Plastic and water paints may be used over the sealer, provided they are applied in accordance with the manufacturer's directions.

**Kitchen cabinets.** For kitchen cabinets, the craftsman has a wide choice of finishes to select from—for example, semigloss paint that produces a satin finish, a gloss paint that produces a lustrous finish, enamel that produces a high gloss, or natural or stained wood effects. Any of these types of finish will be found satisfactory in appearance and wearing quality. Natural and stained finishes have already been discussed in this chapter; painted finishes are described below.

Before starting the finishing operation, the surfaces must be sandpapered smooth, and they must be free of all tool marks. All hardware such as pulls, catches, and latches must be removed while the work of finishing is done.

After sanding has been completed, apply a coat of plywood resin sealer to all surfaces. When this is dry, sand with a fine garnet. A coat of white primer should be applied, regardless of the ultimate color of the cabinets. Under enamel, it is well to use enamel undercoater as a primer.

When the priming coat has dried, all nail holes, cracks, or dents that were not previously repaired should be filled with putty or some other type of crack filler. The filler should be allowed to dry; then the surfaces are sandpapered lightly with extra or super fine waterproof sandpaper. Moistening the abrasive paper with water will help to keep the dust down. When sanding has been completed, the work should be dusted with a soft dust brush and then gone over with a cloth moistened with turpentine to pick up any particles of dust that may have remained. The second coat of primer or undercoater may now be applied. When dry, the final coat of flat, semigloss, or glossy, white or colored finish is applied.

If you wish to finish your cabinets with lacquer, it is advisable to use only spray equipment. When lacquer sealer is used in place of the resin sealer, it should be followed by several spray applications of colored lacquer. When purchasing lacquer material be careful not to mix brands. Use the sealer recommended by the maker of the lacquer that is to be used.

**Woodwork and walls.** Information on the use of finishing materials for walls and woodwork can be obtained from free booklets distributed by all large finishing manufacturers through their retail dealers. While recommending this dealer literature, the general subject is of sufficient interest and importance to justify repetition of some of the operations involved.

*New woodwork.* New woodwork is finished just the same as a piece of furniture, by using varnish or lacquer, clear or colored, applied by brush or spray. If the material is sprayed, a pressure feed tank is best in view of the volume of material likely to be used, but good work can be done with a quart cup. If the walls are to be finished at the same time, overspray is of no great consequence, and suffi-

ciently close masking can be done with a piece of cardboard. If the cardboard is changed frequently, masking in this manner can produce a very clean operation. Pitch streaks in cheap interior trim woods, such as white and yellow pine, are likely to cause trouble and should be sealed with shellac or shellac mixing lacquer. Aluminum powder may be added.

*Old woodwork.* Old woodwork must be clean before any finishing coat is applied. Wash it thoroughly with soap and water to which sal soda or ammonia has been added (1 pint of ammonia or ½ pound of sal soda per gallon). Scuff with medium garnet or aluminum oxide sandpaper on a wood block to remove nibs in the old finish. Dust off and then apply the new finishing coat. Use a 2-inch brush or a spray gun. In the selection of a finishing material, it should be remembered that lacquer cannot be applied over varnish since it will lift the old finish, or, if it does go on, will crack at some later date. Any other type of finishing material will generally work satisfactorily. Old mahogany woodwork which is to be enameled should be given a sealer coat of shellac or aluminum paint to prevent possible bleeding of the old mahogany color.

*Walls.* A wide variety of wall paints in flat, satin, and gloss are available, any of which will give good results when used as specified. On plaster not previously painted, a sizing coat of thin varnish is necessary to seal the surface; 2 pounds of zinc sulfate in 1 gallon of water can be applied as a size coat or one of the special paints for this purpose can be used.

**Insulation board.** Insulation board is generally used for wall and ceiling material; however, it may also be used for panels in built-in projects, in the natural-wood colors supplied by the manufacturer, or as a base for decorative finishes of various types. This type of material is also called wallboard.

Calcimine and water paints may be applied directly to unsized insulation board; calcimines may also be applied to varnish-sized surfaces, in which case they can later be easily removed by washing. Water paints of the casein-base type are washable to a certain degree but not quite so much so as oil or varnish paints.

A single coat of good casein-base water paint will usually give good coverage on insulation board, although 2 coats are recommended. Some of these paints are available tinted in a variety of attractive pastel shades. Others can be tinted from the white by the addition of dry colors in accordance with manufacturer's directions.

Stains may be used where the natural color of the insulation board is to be modified without destroying the texture and where its sound-absorbing properties are of importance. While a variety of stains are available, glue stains usually give the best results on insulation board. A satisfactory glue stain may be made by dissolving ½ pound of flake or ground glue in a gallon of boiling water.

After the glue has thoroughly dissolved, dry color is added in amounts depending on the depth of tone desired. The dry colors are best added by mixing them with a small amount of water, stirring to a thin paste which is more easily taken up by the glue solution. Glue stains of this type must be used promptly after preparation. They should, if possible, be applied while they are still warm. Alcohol stains are not recommended—they dry too rapidly, leaving brush marks.

Insulation board must be properly sized before application of oil or varnish paints. A satisfactory glue size may be made by dissolving 1½ pounds of chip or flake glue in a gallon of boiling water. Various prepared oil or varnish sizes, ready-mixed and properly proportioned for direct application to insulation board, may be obtained. The best results are obtained if the surface is sanded lightly after the size

coat has dried thoroughly. Then apply the paint, using the desired number of coats for satisfactory results.

Plastic paints are thick paints which can be textured by manipulating the brush or various tools to produce various effects. They are divided into 2 groups—those prepared by the addition of water to a powder and those having a linseed-oil base, furnished prepared for use. Water-base plastic paints, unless excessively alkaline, can usually be applied directly to unsized insulation board. For oil-base plastic paints, the insulation board should be sized in the same manner as for oil or varnish paints.

**Hardboard.** Practically any type of finishing material may be used on hardboard —oil paint, water paint, enamel stain, lacquer, shellac, varnish, penetrating sealers, wax, and special finishes. By following the manufacturer's directions and applying the finishes in the same manner as on a hardwood surface, satisfactory results are obtained. The surface must be free of all dirt, grease, and other foreign material before a finish is applied. Dirt may be removed with water and a mild soap, grease with carbon tetrachloride or naphtha. Be sure the hardboard panel is dry before starting to finish it.

# INDEX


Accessories, bathroom, 146–148
Accordion door, 189
Acoustical tile, 34, 187
Adhesives, 12, 29–30, 41
Asphalt tile, 37–38, 115, 136, 163, 185
Attic, model, 163–176
  planning, 154

Bar, snack, 190, 193
Base kitchen cabinets, 76, 78, 81–83
Base units, 48, 50
Basement, model, 189–199
  planning, 181
Basement columns, 185
Basement stairs, 185
Bathroom, heating, 142, 146
  improvement, 133–153
  model, 151–153
  planning, 133–135, 161
Bathroom accessories, 146–148
Bathroom fixtures, 135–136
Bathtub enclosure, 148–149
Bed, 97–98, 117–118, 165, 176, 180
Bedding-storage unit, 66–67
Bedroom, closet, 208–209
  improvements, 97–114
  planning, 97
Bench, toy, 129
  wall, 189–190
Blackboard, 129
Bleaching wood, 233
Bookcases, 23, 56, 189
Bookshelves, 29, 44, 53–56, 60, 180
Boring holes, 8, 10
Brushes, paint, 229
Bunk-bed, 117–118, 165
Butt joint, 13, 14

Cabinet, 23, 93
  children's, 115–116
  clothing, 47
  corner, 56, 58
Cabinet, kitchen, 75–85
  dimensions, 75–76
  laundry, 94–96
  lavatory, 137–138, 140–141
  medicine, 138–139
  odds-and-ends, 142–144
  radio, 51, 53–55, 58, 197
  ready-made, 76–78, 137
  record, 51, 53–57, 197
  shelf-drawer, 131–132
  shoe, 48
  sliding-door, 44, 45
  steel, 76
  television, 52, 58, 197
  towel, 138–139
  trunk and luggage, 170–171
  utensil, 92
  utility, 83–84, 139, 142
Cabinet doors, rebuilding, 84–85
Catches, 19–20
Cedar closet, 214–215
Ceilings, 33–35, 184
  repairs, 33–35
Ceramic tile, 22, 33, 136
Chest, hideaway, 215–216
Chest of drawers, 100–103
Child's room, planning, 115–117
Chiseling, 3, 8–9, 24
Chopping block, 90
Cleanser rack, 91
Closet, bedroom, 208–209
  cedar, 214–215
  child's, 124–125
  clothes, 167, 202, 203, 205, 208, 226
  coat, 205
  corner, 202
  entry, 205–207
  fixtures for, 202–205
  housekeeping, 170, 209, 212–214
  lighting, 218
  linen, 175, 209–211
  office, 215
  outdoor, 219
  planning, 200–205
Closet, shelves in, 204
  storage, 173
  understairs, 214
  walk-in, 173, 201, 202
  wardrobe, 106–113, 122–124, 202
Clothes bin, 46
Clothes closet, 167, 202–203, 205, 208, 226
Clothes drier, 142, 146
Clothes hamper, 139, 142
Coat closet, 205
Condiment rack, 91
Corner cabinet, 76, 79, 81, 202
Cornices, window, 67–69
Couch, 66–67
Counter coverings, 40–41, 78–79, 81
Cupboard, 67

Dado joint, 13, 14
Dampness, cure for, 181–182, 187
Darkroom, 194
Desk, 46–47, 53–55, 61, 63–67, 91, 106–107, 115–116, 166, 174
Door, accordion, 189
  cabinet, rebuilding, 84–85
  mirror, 114, 124
  modernizing, 39–40
  sliding, 216, 218
  storage unit, 204
Dormer windows, 155–157, 163
Dovetail joint, 14, 15
Doweling, 13–15
Drawer, construction, 83, 115, 120
  knife, 89
  linen, 89
  recipe, 89
  silver, 89
  unit, 45–46, 119–121
Drawer pulls, 20, 46
Drawers, chest of, 100–103
Dresser, 100–103, 122

Drilling, 8, 10, 23
Drop ceiling, 74, 83–84, 119, 120

Edge treatments, 15–17, 41, 81
Enameling, 229–230, 235
Enclosure, bathtub, 148–149
  heater, 186
  lavatory, 149–151
  shower, 151
End table, 66–67
Entry closet, 205–207
Estimating materials, 6
Exhaust fan, 74, 183
Extension, garage, 219–220

Fasteners, 9–10, 23, 28
Fiberboard, 34–35
Fillers, 231–232
Finishing, blond, 233–234
  cabinet door, 85
  floor, 35–37, 115, 136–137, 163, 184
  gypsum board, 31–32
  hardboard, 237
  insulation board, 30, 35, 236–237
  kitchen cabinets, 235
  lacquer, 232–233
  paint, 184–185, 187
  plywood, 234–235
  radiators, 60
  rubbing, 232, 233
  varnish, 232
  walls, 235–236
  wax, 233
  woodwork, 235–236
Fixtures, bathroom, 135–136
  closet, 202–205
Floor, 35–39
  attic, 154–155, 163
  basement, 184–185, 187
  bathroom, 136–137
  laying, 37–39
  refinishing, 35–37, 39
  repair, 35–36
Foldaway dinette table, 86–88
Fold-down table, 88–89
Framing, dormer, 155, 157
  wall, 24–26, 29–30, 159–160, 180, 183–184, 215

Galley kitchen, 196
Garage extension, 219–220
Garage storage, 226
Glass blocks, 33, 151
Glues, 12
Gluing, 3, 11–13, 227
Gypsum board, 30–32, 34–35, 216

Hanging, cabinet doors, 19
  wall objects, 22
Hardboard, 6, 8, 32–33, 39, 78, 183–184
  finishing, 237
Hardware installation, 17–20
Hardwoods, 4–5, 6, 8, 9, 228
Headboards, 97, 99–100
Heating, 142, 146, 160–161, 186
Heating enclosure, 186
Hinges, 17–19
Housekeeping closet, 170, 209, 212–214

Insulation, 60, 161–162
Insulation board, 29–30, 34–35
  finishing, 30, 35, 236–237
Ironing board, 93–94
Island entry closet, 205–207

Joint units, 48–49
Jointing lumber, 13–15
Joints, 3, 13–15, 24–27, 29–33, 227

Kiln drying, 6
Kitchen, conveniences, 89–92
  galley, 196
  improvements, 70–92
  lighting, 73–75
  organizations, 70–75
  storage requirements, 75
  types, 73
  ventilation, 73–74
  work centers, 71–73
Kitchen cabinet, 75–85
  finishing, 235
  hinges, 17
Knife box, 91
Knife drawer, 89

Lacquer, 227, 229, 232–233, 235
Laminated plastic, 40–41, 78, 151
Lap joint, 13, 14
Laundry, improvements, 93–96
  planning, 93
Laundry cabinet, 94–96
Lavatory cabinet, 137–138
Lavatory enclosure, 149–151
Lazy Susans, 82
Lighting, 68, 73–75, 115, 117, 161, 183, 187, 218
Linen closet, 175, 209–211
Linen drawer, 89
Linoleum, 37–41, 78, 81, 115, 136, 151, 163
Living-area improvements, 42–70
Louvers, 162
Lumber, classification, 4
  grades, 4, 5
  sizes, 5–6
  storage, 189
Lumber calculator, 7

Magazine stand, 52–53
Marking materials, 3
Measuring, 3
Medicine chest, 138
Mending plates, 11, 49, 56
Metal tile, 33
Mirror, door, 114, 124, 209
Miter joint, 13–14, 16
Model attics, 163–176
Model bathroom, 151–153
Model-builder's workbench, 132
Mortising, 9, 13–15
Movie screen valance, 197

Nailing, 3, 9–10, 22–23, 27, 29–31, 227
Niches, 23–24, 61–62
Night stands, 100–102
Noise problem, 187

Office closet, 215
Outdoor closet, 219
Outdoor shed, 219
Outdoor storage wall, 220, 224–225

Paint brushes, 229
Paint-spray booth, 189
Paint spraying, 229
Pan rack, 90
Paneling, plywood, 24–28, 183
  wood, 28–29, 183

Planing, 3
Planting box, 172
Plaster repairs, 21–22
Plasterboard, 22–24, 30–32, 34–35, 183–184, 216
Plastic tile, 33
Playtable, 128–129
Plywood, 6, 8, 15–17, 24–28, 34–35, 39–41, 78, 115, 163, 183–184
  finishing, 234–235
  plank, 27–28
Prefinished hardboard, 32–33

Rabbet joint, 13, 14
Rack, condiment, 91
  pan, 90
  soap and cleanser, 91
  tray, 92
Radiator covers, 60, 119–120
Radio cabinet, 51, 53–55, 58, 197
Rawlplugs, 23
Ready-made cabinets, 76–78, 137
Recessed shelves, 90, 119
Recipe file, 89
Record-album storage, 46, 53–55
Record cabinet, 51, 53–57, 197
Recreation room, model, 189–199
  planning, 181
Refinishing, cabinet door, 84–85
  floors, 35–37, 39
Repairing, cracks, 21–22
  floors, 35–37
Replacing tiles, 22
Rubbing finishes, 232, 233

Sanding, 227–228, 235
Sandpaper, 228
Sawing, 3, 8
Screen wall, 58–59
Screwing, 3, 10–11, 227
Sealer, 231–232
Sectional units, 49–51
Sewing storage unit, 171, 173
Shed, outdoor, 219
Shelf, brackets, 56, 120
  construction, 56, 119
  snack, 90
  storage, 92
  unit, 46
Shelf-drawer cabinet, 131–132
Shellac, 229, 231, 232
Shelves, book, 56
  closet, 204
  magazine, 52
  recessed, 90, 119
Shoe cabinet, 48
Shoe storage, 204
Shower enclosures, 151
Sink top, 40–41, 78–79, 81, 93
Silver drawer, 89
Sliding doors, 216, 218
Snack bar, 190, 193
Snack shelf, 90
Soap rack, 91
Softwoods, 4, 228
Spray booth, 189
Spraying, paint, 229
Stain, 229, 230
Stairs, 185–186
Stool, 106–107
Storage, lumber, 189
  planning, 200–205
  shoe, 204
  tool, 188–189, 226
Storage closet, 173
Storage island, 198–199
Storage port, 222–223
Storage shelf, 92
Storage unit, bedding, 66–67
  door, 204–205
  end and side, 167
  garage, 226
  high, 168
  sewing, 171, 173
  toy, 122
  under-eave, 177–180
  understairs, 216–217
Storage wall, 42–49, 53–55, 92, 118–122, 192, 220, 224–225
Subflooring, 35, 154–155

Table, dinette, 86–89
  end, 66–67
  telephone, 61–62
  tennis, 195
  train, 129–131
  vanity, 103–106, 126–128, 146–147
  work, 174
Tacking panel, 128–129
Telephone stands, 61–62
Television cabinet, 52, 58, 197
Tennis table, 195
Tile, asphalt, 37–38, 115, 136, 163, 185
  ceramic, 22, 33, 136
  metal, 33
Toggle bolts, 23
Tool panels, 188
Tool storage, 188–189, 226
Tools, 2, 3
Towel cabinet, 138–139
Toy bench, 129
Toy storage closet, 124–125
Toy storage unit, 122
Train table, 129–131
Tray racks, 92

Under-eave storage, 177
Understair closet, 214
Understair storage, 216–217
Utensil cabinet, 92
Utility cabinet, 83–84

Valance, movie screen, 197
  window, 67–69
Vanity table, 103–106, 126–128, 146–147
Varnish, 229, 232
Ventilation, 73–74, 162, 183, 187, 200

Walk-in storage closet, 173, 201–202
Wall, cutouts, 23
  dividers, 2, 3, 58–59
  finishing, 30–31, 183, 235–236
  paneling, 24–33
  remodeling, 21–33, 136–137, 183–184
  replacing, 24
Wall bench, 189–190
Wall cabinet, 76–80
Wallboard, 22–24, 29–33, 183
Wardrobe closet, 106–113, 122–124, 202
Wax finishes, 233
Window, cornices, 67–69
  dormer, 155–157, 163
Window seat, 175
Wiring, 161, 182–183, 187
Wood finishing, 227
Woodwork finishing, 235–236
Workbench, 128–129, 132, 187–188
Workshop, 186–189
Worktable, 174

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ROBERT SCHARFF is as skillful with tools as with the typewriter. His studies at Pratt Institute were interrupted by the war when he spent three years in the Navy as a teacher of radar. Then, after further study at the University of Houston, he operated his own lumberyard and cabinetmaking business—and in his spare time wrote a home-repair column under the title "Mr. Fix" for a newspaper syndicate. This naturally led to free-lance writing for such magazines as *American Home, Good Housekeeping, Living for Young Homemakers, Popular Mechanics, Science and Mechanics, American Magazine,* and to the Home Workshop Editorship of *Argosy*. Mr. Scharff is also author of three books, *Plywood Projects for the Home Craftsman, Handicraft Hobbies for Profit,* and *Improve Your Home with Built-ins.* Married and the father of two daughters, Mr. Scharff spends a good deal of time improving his own home with projects which develop into magazine articles for home craftsmen.

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